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# VARIOLA OVINA,

SHEEP'S SMALL POX;

OR THE

LAWS OF CONTAGIOUS EPIDEMICS ILLUSTRATED

BY AN EXPERIMENTAL TYPE.

BY

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*Veluti in Speculo.*

[Being the Address in Medicine delivered at the Annual Meeting of the British Medical Association, August 1863; and reprinted from the  
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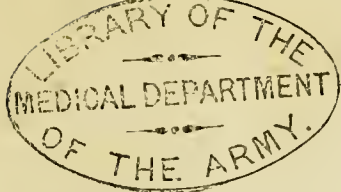
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VARIOLA OVINA, SHEEP'S SMALL-POX; OR  
THE LAWS OF CONTAGIOUS EPIDEMICS  
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MENTAL TYPE.

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"L'épidémie est l'effet et non la cause de la contagion."—*Gendron de l'Eure.*

"Veluti in speculo."

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IN complying with the request of the Association to deliver the Address in Medicine for the present year, I shall follow the example of my immediate predecessors, and confine myself to a single theme. For reasons which will, probably, be readily understood by many who hear me, the particular theme I have chosen is one bearing on the subject of epidemics. There is no need in an assembly like this to dilate on its importance.

There are few secrets in nature which it is of greater moment to man to penetrate, than that of the rise, spread, and deadly power of these terrible scourges. In the aggregate, take the world through, they cause more untimely deaths, more sickness, more sorrow, more loss of labour, bodily and mental, than any of the other ills to which humanity is subject. They attack us in the cradle, they pursue us through youth and manhood; in old age, they still linger about our path. They are among our greatest hindrances in the battle of life, even when they do not end life itself by a sudden and invisible stroke. Every year, in all lands, a vast hecatomb of men prematurely gathered to the grave bears witness to their power.

To rescue mankind from the grasp of epidemic disorders should, therefore, be the settled, as it must always be the highest, ambition of our art. With Jenner's immortal discovery before us to show that such an ambition is neither presumptuous nor vain,

the growing attention paid, of late years, to this great subject is easily understood.

In England, as is well known, a society has been established for its sole and special cultivation. In the annual reports of the French Academy of Medicine, epidemics have long occupied a large space. In Germany, as, indeed, in all countries in which medicine is studied as a science, they are fast rising as objects of inquiry into the prominence which their importance deserves.

Unfortunately, the advance of knowledge bears, as yet, but scant proportion to the efforts spent in its pursuit. This, as it seems to me, may be mainly traced to two causes; first, to an exaggerated estimate of the difficulties of the subject; and secondly, to want of clear views as to the method to be followed in its investigation. Authors have occupied themselves far too much in dwelling on the inscrutable nature of epidemic poisons, and in accumulating epithets to signify the hopelessness of attempts to discover the laws of their action. This practice hinders the advance of science, by discouraging inquiry; and, still more fatally, by begetting a prejudice against precise views, on the plea that such views are unattainable, and hence cannot be in accordance with truth.

The difficulties of the subject are obvious. The material causes of epidemics are invisible; and the laws which govern invisible things must needs be hard to make out. But that they may be perfectly made out is clear from this, that the invisible powers of nature, such as gravitation, for instance, are the very powers of which our knowledge is the most sure and precise.

On the other hand, the problem of the epidemiologist has in it at least one element of simplicity which is denied to the student of other diseases; namely, that its chief concern is with the history of a single cause. His principal task is to trace, in each case, the biography, if I may so speak, of a single species. The method most in vogue in inquiries of this kind, as hitherto conducted, is to accumulate a mass of statistical details—meteorological, physiological, topographical, and other—relating to the particular epidemic disease which may happen to be in question, often with the most impartial indifference as to whether these details establish anything of importance, or not.

If we had not experience to appeal to in proof of the assertion, it would not be difficult to show, on

philosophical grounds, that this mode of proceeding must necessarily be extremely barren of results. Evidence so collected is, no doubt, of value; but chiefly as furnishing data for the real discoverer to work upon.

Statistics afford much important information on epidemics; but it is all of a general kind. The really vital questions they leave almost untouched. Neither on the mode of being of the morbid agent without the body, nor on its mode of action within, do they throw any but a dim and distant light. Happily, there is another principle at our service which is of far greater promise.

The chief difficulty of the inquiry arises, as I said before, from the fact, that its subjects are, for the most part, not objects of sense, but only known by their effects. In the face of this difficulty, the only sure way of proceeding is to begin with the study of those types which in their mode of action offer something tangible for the observer to lay hold of; something that may enable him to bring the diffuse, vagrant, and impalpable thing into the witness-box—if I may use such an expression—and to put to it definite questions with some chance of definite answers.

What we want is some clue, however slender, to guide us through the obscurity in which the truth lies hid. Now, exactly such a clue is found in that most remarkable of properties; the power which certain epidemic disorders possess of spreading by contagion. In the act of contagion, we are brought into direct relation with the epidemic poison at one very important phase of its existence. Before this address is concluded, I hope to make it clear that in the conditions which often attach to this act, there are data which will carry us very deep into the secrets we most desire to know.

The first position I would take, therefore, is, that if we wish to obtain clear views on the subject of epidemics generally, our surest plan is to begin with the study of the contagious group.

The next position speaks for itself. It is, that of this group we should select those which, from peculiarities in the mode of evolution of the virus, admit of being propagated artificially; which offer, in other words, the incomparable advantage of being studied experimentally. I say "incomparable", because, however arduous the problem, the whole history of science shows that, where once this all-potent method of put-

ting questions to nature can be used with effect, all difficulties go down before it.

If we were asked to define what other conditions we would most desire, in order to make our task the more easy, our answer would be, that all the sufferers should be under our own eye; that their incomings and outgoings and intercourse with one another should be known to us; or, better still, should be determined by our own will. It will be seen at once that, taken together, these conditions are not to be met with in human life. They are only to be found, in fact, in the case of the domestic animals.†

Since we last met, the West of England has witnessed an epidemic among one of the chief of these, in which all the conditions just enumerated were fulfilled to the letter, with one more added, almost equal in value to all the rest. The pest, in the case to which I refer, was entirely new to the country in which it raged. For a century, at least, nothing has occurred in this island more deeply instructive to the epidemiologist than the remarkable outbreak of the disease popularly known by the name of small-pox, which ravaged the Wiltshire flocks last autumn. For this, I need scarcely say, is the event of which I speak.

On the 13th September, 1862, while the disorder was still rife, I visited the diseased flocks, and enjoyed the great privilege of studying the malady from the life, under the able guidance of Professor Simonds. I beg to take this opportunity of returning publicly to that gentleman, my best thanks for the great kindness he showed to me on that occasion.‡

As there were still, at that time, some six or eight hundred patients in all stages of the disorder, it was not difficult, under such able teaching, to become acquainted, even in the short compass of a single day, with its leading characteristics.

† There can be no more striking proof of the little way the philosophy of this branch of inquiry has made among us than the small space given to epizootics by the professed epidemiologist. The only scientific accounts of them must be sought for in the works of veterinarians. With the exception of our distinguished associate Mr. Ceely, of Sir H. Holland, and of one or two others, the allusions of English physicians to the diseases of animals are only remarkable as betraying their ignorance of the whole subject.

‡ With the liberality characteristic of the true man of science, Professor Simonds communicated to me at once all he knew of the history of the outbreak, and at the cost of infinite pains demonstrated to me all the leading features of the disorder.

Awaiting the fuller and more accurate record of this outbreak, which I trust we are yet to have, from one or both of the eminent men who advised the government in the emergency, I will ask your permission, in default of a better topic, to occupy the remainder of the short hour allotted to these addresses in laying before you the more salient points of the information I then acquired, together with some reflections which have been since suggested to me by the study of the disease in veterinary works.† In doing this, it is hardly necessary to observe that I shall not treat the subject in its bearing on agricultural interests, but in its purely scientific and medical aspects.‡

After what I have already said, no apology will be needed for thus bringing to the notice of gentlemen whose lives are passed in watching the diseases of men, a disease which is peculiar to one of the lower animals. The very name which this distemper bears—*small-pox* in sheep—attests its human interest, as the series of relations which suggested this name, attests the entire applicability of any inferences drawn from it to the great and important group of which human small-pox is the type. In passing under review the phenomena of this outbreak, we shall, in fact, find ourselves reviewing the phenomena—and I may add discussing the questions—which most press upon the mind in regard to the contagious fevers of our own race.

As the disease itself, except as a matter of common report, is probably new to most of my hearers, a few preliminary words as to its history and characters may not be out of place.

As to its history in past time, but little is known. Its first origin, like that of human small-pox, is lost in the mist of ages, and hidden by the same impenetrable veil which hides the first origin of all other

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† The sources from which what follows is mostly drawn, are—1. Information acquired in my visit to Allington; 2. Professor Simonds' masterly monograph on *Variola Ovina*; 3. Hurtel d'Arboval's admirable articles on "Clavelée", "Claveau", "Clavelisation", "Vaccination", and "Vaccine", in the *Dictionnaire de Médecine Vétérinaire*; Professor Tronseau's *Clinique Médicale*; and various articles on the Wilts outbreak, by Professors Simonds and Gamgee, in the *Veterinarian* and the *Edinburgh Veterinary Review*.

‡ For this reason, I shall make no reference, for instance, to the animated discussion which has sprung up as to the way in which these interests were affected by the practice of inoculation in the infected district.

created things. Like human small-pox—on what grounds I do not exactly know—it is supposed to have first come into being, in the great, mysterious, maternal East. In Europe, it can be traced distinctly back only to the sixteenth century. The first clear account of the disease in any European tongue, is to be found, it is said—for I do not speak of my own knowledge—in the writings of Rabelais. From an early period it has covered a very wide area in the Old World. India and Africa have been infested by it from time immemorial. America still lives in happy ignorance of this ovine plague; but there is no province in continental Europe whose flocks have not suffered severely from it. In Italy and Spain, the *clavelée*, as the French call the malady, is the one great dread of the flock-master. In Bessarabia, Austria, Prussia, Holstein, Denmark, and Holland, it is a standing scourge. The whole north of France is the scene of frequent epidemics of it. But, until some seventeen years ago—with, perhaps, one doubtful exception—the disease had remained entirely unknown in this country. Up to that date, the shepherd of Picardy, watching with dismay his dying and plague-stricken lambs, covered with the well known blains, might look with envious eyes across the narrow channel, and almost see on a clear day, browsing on the white cliffs of the sea-girt island opposite, countless flocks that from all time had lived in virgin immunity from the pest at his feet.

“The circumstance is easy to explain,” says Hurel d’Arboval, “if we reflect that in almost all cases the disease is the result of contagion, and if we consider the severe measures enforced in England against the importation of foreign sheep into that island.” (*Dictionnaire de Médecine Vétérinaire*, article ‘*Clavelée*’.)

The time had now come when this long-standing contrast was to cease. With the triumph of free-trade, the measures referred to by the French veterinarian were relaxed, and foreign sheep were admitted without stint. Before the year 1847, the whole number imported amounted only to a few hundreds, selected, too, for the most part, by the English agriculturist for some special merits, with all the care to ensure freedom from disease which such a proceeding implies. A few years afterwards, the number had grown to several hundred thousand; and the sheep, instead of being picked out from the foreign fold by the English buyer,

were sent wholesale to the English market as an article of common commerce by the foreign flock-master. Unfortunately, the change fell upon an evil time. Quarantine and all other measures intended to prevent the introduction of disease from abroad had fallen into discredit, if not into disuse. Contagion, as a cause of epidemic disease, had come to be looked upon as a thing of small account. Worse still, the strange and fatal delusion had got hold of men's minds, that the specific poisons of specific contagious disorders may be bred for the nonce, anywhere, out of filth, organic impurities, or what not. It seemed to be a waste of power to be taking precautions against the importation from without of what might turn up any day as a home product.

Want of acquaintance with the epidemic and contagious maladies of foreign live-stock had, no doubt, its share, also, in allaying the vigilance the occasion so much needed. And so it happened that the barriers were thrown down, without those precautions being taken which alone could render the proceeding safe. The result has been that, within the short space of sixteen years, England, which for the whole thousand years before had never known this plague, has thrice seen it commit great havoc in her flocks. Thus have we become indebted to the British government for events disastrous to agriculture; but, could they be made to tell their whole tale, of the utmost value to science.

On the characters of the disease itself I need not dwell long. The name it bears enables me to dispense with any lengthened description. What human small-pox is to man, that precisely, and in all ways, is this disease to the sheep. It is a contagious eruptive fever, which spreads in what is called the natural way, but is susceptible also of being inoculated. Like small-pox—and, I may add, like all the other contagious fevers—it unites the two fundamental characteristics of having a period of incubation, and of occurring but once in life.†

By comparing the drawings here exhibited, you may see how close and striking is the outward resemblance of the eruption in the two diseases. Its distri-

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† For the sake of simplicity, the word "contagion" is used throughout this essay as signifying the communication of a specific disease, through whatever medium, by specific germs thrown off by subjects already suffering from it.



bntion in each is exactly alike. The skin, the nostrils and fances, and the upper part of the respiratory tract, are its common seat in both. In both, the mode of evolution is the same.

The ovine eruption begins under the form of papulæ, confluent or discrete, culminating in a vesicle which is often marked by a central depression, and is filled by lymph, which, at first translucent, ends in becoming opaque. It forms crusts, which fall away by a slow desquamation. It leaves pits. Not rarely falling upon the eye, it leads to blindness. It is a frequent cause of abortion; the dropped lambs being, in this case, often covered with variolous pustules.

There is the same parallelism between the two in the constitutional disturbance. Ovine small-pox is ushered in by high fever and great general distress, which are relieved for a time by the eruption, to recur again under the typhoid form in the suppurative stage. It is often attended by bloody urine and extensive ecchymoses. It kills in the same way as its human antitype.

If you examine the drawings minutely, you will observe some marked differences. The papulæ, for instance, are much broader in the sheep, varying in breadth from that of a fourpenny-picce to that of a shilling: having the appearance of large flat warts occupying the whole thickness of the skin, and imbedded in it. Other points of difference might be noted if need were, and if time allowed. It is rather, however, with the points of resemblance than with those of difference that we are here concerned. It is sufficient to our present purpose to know that this is a typical member of the great group of contagious fevers, which are propagated by a specific poison, which have a period of incubation, which multiply as they go, and which occur but once in life.

The farm in which this remarkable disease suddenly made its appearance in June last year is situated in the parish of Allington, about seven miles north-east of Devizes, and at the foot of the range of chalk-hills known as the Beckingham Downs. Ingazing upon that fine, open, breezy country, the idea of pestilence is the last that would ever occur to the mind. The sheep first attacked were the property of Mr. Joseph Parry, a gentleman noted for the pure breed and healthy character of his flock.

As far as there is evidence to show, the outbreak itself



began, as such outbreaks generally do, with a single case. Towards the latter end of June, Mr. Parry, riding alongside one of his folds containing about three hundred ewes, observed one of them lying on the hurdles, at the point of death. She was, in fact, in the last stage of *variola ovina*, and died shortly after. The carcase was put aside, and little was thought of the circumstance. In the course of a few days, other sheep of the same lot were attacked, and died in the same way; and Mr. Parry was soon made aware that his flock was becoming the prey of a new and fatal scourge. The two-year old ewes had up to that time been kept with their lambs; but, it being thought better to separate them, the lambs were removed and put with other lambs on the farm, the ewes being turned among the general breeding stock—making altogether a thousand ewes and seven hundred lambs. Unfortunately, both ewes and lambs carried the infection with them.

In about a fortnight—which, I may remark, is about the average period of incubation when the disease is taken in the natural way—the same symptoms began to show themselves in the flock generally. From this time the march of events was swift. By the end of July, more than four hundred sheep had been attacked, and two hundred or thereabouts had already perished. So rapidly and with such fatal effect did the heaven work.

Things were at this pass when, on the 1st of August, Professor Simonds, who had been summoned from London, arrived at Allington. “As the best means of saving the rest of the flock, and of putting a definite term to the outbreak, this gentleman resolved to inoculate the whole flock”—an operation that was performed without delay.

Before the epidemic ceased, it had spread to eight or nine other farms, and nearly 800 sheep had fallen a sacrifice to it. When I visited Wiltshire on the 13th September following, there were still, as I said before, some 700 sheep in various stages of the disease. Of these, some few had taken the disorder in the natural way, but by far the greater number by inoculation.

To the physician, not the least interesting thing was to see a measure, which once had so great a vogue as a means for disarming the malignity of human small-pox, employed with the same aims, and with precisely the same results, in the corresponding

disease of the animal. In both, the common result was the evolution of a disease of incomparably milder type than when taken in the natural way. But the great importance of the phenomena presented by inoculation consists in the clear light they throw on the nature of the disorder. In the majority of the inoculated cases, the variola appeared in the mildest possible form. The eruption was limited to a single vesicle, and constitutional disturbance was slight or altogether absent. In some few, the course of events was otherwise; and the malady, although inoculated, took a malignant turn. One such case I saw. A sheep that had been inoculated some days before—in result, no doubt, of some individual predisposition—threw out a confluent eruption. The animal was at once sacrificed. Had the papulæ been allowed to develop into vesicles, there would have come from the minute atom of virus inserted by the lancet a few days before, a new crop sufficient to communicate the same disease to all the sheep in Wiltshire.†

Here, then, in results free from all ambiguity, and open to the eye, the great fact is revealed, that it is in the body of the sheep that this strange poison is fashioned and multiplied; and that the disease itself is the process by which it is bred.

In this one experimental almost everything is comprised.

We see, first, how minute a germ is sufficient to produce the disorder; we see, again, how, by reason of this very minuteness, signs of general disturbance are absent until growth has taken place; and, lastly, in the immeasurable multiplication which follows, we understand in what way provision is made for the extension of the disease, until, from a single first case, a whole epidemic is evolved.

The spectacle presented to us is, indeed, not new. To the physicians of the last century, as seen in the case of human small-pox, it was sufficiently familiar. But, for some reason or other, we have been singularly slow in applying the lesson it so plainly taught.

I may add, that one of the main points of interest in the fact here recorded is, that it repeats in one of the lower animals a series of relations that had already been observed of another and kindred disease in man.

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† Professor Simonds has recorded several exactly similar instances in his work on *Variola Ovina*.

We thus see, by the light of another pregnant and typical instance, exactly what a contagious fever is.

But what a form is this for disease to take! The phenomena, striking as they are when the result of inoculation, are still more so when they occur in the natural way. In the first instance, the mode of admission of the poison, at least, is known; in the second, it enters in through paths yet to be traced. Here, as in so many other cases, our perception of the marvellous nature of the facts is dimmed by our familiarity with them. In some sense, their succession is, no doubt, more or less clearly apprehended; but the language habitually used to express them seems to me to fall far short of an adequate statement of the mystery. What in the whole range of medicine is so striking as this invasion of the yet living and unbroken frame by a power which, like an evil spirit of the olden time—unseen, untraceable, and unbidden, enters in and takes possession, and holds riot and revel there, to issue forth again reinforced by a countless progeny? What so wonderful as this *imperium in imperio*, in which the majestic spirit that animates the human form is dethroned, and the noble form itself is often marred and laid in the dust, by a thing in comparison with which mildew and toadstool stand high in the scale of being?

To resume, then, we have it as the result of experiment, that the virus of variola ovina is bred in the body of the sheep. By the same means it has been ascertained that this virus is incapable of breeding in the body of any other animal, or, at least, of the great group of animals that are familiar to us, and that, like sheep, come into relation with us in our daily life. Pigs, horses, poultry of all kinds, dogs, cats, rabbits, monkeys, and even the goat, which in nature and organisation is, so to speak, but one remove from the sheep, have all been inoculated with it in vain.† The same fact holds good as to the ox tribe; and lastly, as to man himself. The experiments have been often repeated in various countries, and always, as far as I have been able to learn, with the same negative result.‡

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† At one of the infected farms in Wilts, there was a goat which passed its whole time with the diseased sheep, and was inoculated more than once, but entirely without effect.

‡ See for details, Hurtrel d'Arboval's articles, "Clavelée", "Claveau", and "Clavelisation", in the *Dictionnaire de Médecine Vétérinaire*; and Professor Simonds' work on *Variola Ovina*.

As it was supposed that the virus might prove a substitute for vaccine, and might possibly give even a greater security against small-pox, the experiments on the human body have been more numerous than those on any other species. In spite of some few assertions to the contrary, nothing seems better ascertained than that man is entirely insusceptible of it.†

The experiments of the French and German schools fulfil every scientific requirement, and seem to be conclusive as to the point. The operation, performed, over and over again, on large numbers of unvaccinated children of different ages, always proved abortive. That the failure depended neither on constitutional peculiarity in the subjects, nor on defect in the ovine virus, was shown by a double test. The virus which had proved inert on the children promptly took effect on sheep, while on the other hand, the same children were afterwards vaccinated with success. These results have been verified in this country by experiments on a large scale by Mr. Marson, and by our honoured associate Mr. Ceely, whose name is the best guarantee for the accuracy of the facts. Conjointly, these gentlemen have performed no fewer than 250 vaccinations on the human subject, with the virus of sheep-pox.

"I vaccinated twenty-five subjects," says Mr. Ceely, "whose ages ranged from three to fifteen years, some twice and thrice over; in none were there fewer than six punctures each time, making not less than 180 punctures: no specific disease resulted, but a prompt and devious papular or diffuse inflammation, or more rarely a common local pustular. In the majority of these twenty-five individuals the virus employed was liquid. When any recently charged points were used, subsequent re-inoculation with liquid virus took no other effect. Nearly all the above subjects were shortly afterwards vaccinated with current vaccine lymph, which in each case exhibited the normal effects. I may as well add, also, that the same kind of ovine virus which did not succeed on children, took promptly on sheep." (Simonds *On Variola Ovina*, page 154-5.)

Whether future researches may show these state-

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† The chief, if not the only, witness on the other side is Sacco; but his evident desire to be looked upon as the author of important discoveries, and the fact that not one of his many alleged results have been verified by experiment in other countries, throw great discredit on his statements.

ments to be too absolute, I do not know;† but as they stand at present, they are in entire conformity with what common observation teaches.

In connection with this epidemic in Wilts, perhaps the most striking thing of all, was, that while the sheep were dying, by wholesale, of one of the most terrible of plagues, they were the only animals that suffered. So deadly was it to them, so entirely harmless to every other living thing. In more than one instance indeed, as we shall presently see, the infection passed from flock to flock, over a distance of nearly a mile in length.

But while even to be pastured in fields a mile away from an infected fold, was pestilence and death to sheep, the horses, dogs, oxen, swine, and other live-stock—even the starlings and flies which passed nearly their whole time on the sheeps' backs, with the organs thought to be most prone to receive infection, immersed in the variolous discharge, continued to enjoy the most perfect health.‡ Especially striking, considering the name the disorder bears, was the immunity of the *men* who had charge of the diseased flocks. Yeomen and shepherds fed largely on mutton, men whose bodies might not inaccurately be described as consisting in great part of mutton built up into man—might be seen there, handling the diseased animals in all manner of ways with the most perfect impunity. It is as if we were dealing with some chemical, of reaction so delicate that its presence can only be revealed by a single test; or rather (for this,

† I make this reservation, because it is easy to see, *à priori*, that experiments which issue in merely negative results require to be repeated a great number of times before absolute reliance can be placed upon them. Any one who will read the account of Mr. Ceely's admirable researches on the origin of vaccine, or who has undertaken experimental inquiries of this kind himself, will understand how necessary this condition is. But, after all, we scarcely need the evidence of experiment to show that this disease is peculiarly a disease of sheep.

‡ Professor Gamgee states, on the authority of Mr. John Percival, that a sheep dog belonging to Mr. Stephen Neate of Allcannings, whose flock suffered severely, took the disorder. In the many works I have consulted on the subject of clavelée, although the liability of animals, other than the sheep, is fully discussed, I have found no mention of a similar fact. It would have been well, under the circumstances, if Mr. Percival had tested the identity of the canine disorder by inoculating from the lymph it produced. It was at one time reported that Mr. Parry's dogs had clavelée; and, curiously enough, they were affected with a pustular eruption, but it bore no relation to the disease in the sheep.

no doubt, is the truer analogy) with some parasitic animal or plant, which finds in the organism of a single living species the only conditions of its life. I need not dwell on the extreme importance of this as a characteristic of a poison which is a standing source of wide-spread epidemics.

I may remark, however, that, in greater or less degree, it is a characteristic of the whole family of contagious poisons. Some few among them act in the same specific way on more than one kind, but the greater number seem to affect only a single species. In the most fatal epidemics of scarlet fever, yellow fever, measles, typhoid fever, and typhus, for instance; and it is most strange that so little stress should have been laid on a fact of such profound significance—the animals attendant upon man and in closest communication with him, never appear to suffer from the same plague. The value of the present instance consists in the fact, that it does not come to our knowledge by way of vague inference more or less open to doubt, but is established by the joint and irrefragable testimony of experiment and observation.

The same may be said of one more point on which I have to touch,—and nothing can show more decisively how entirely these contagious fevers are one family group than that you will all anticipate what I am about to say—the *variola ovina*, whether natural or inoculated, once occurring, exhausts the susceptibility to the same poison for the remainder of life. So that this poison not only breeds exclusively in the body of the sheep; but, as a rule, can breed even in the sheep's body but once in life.† So subtle, so incomparably specific are the conditions attaching to the reproduction of these contagious poisons.

But if the propagation of the disease, as studied by the light of inoculation, be thus instructive, its spread in what is called the natural way, as illustrated by the course of events in Wilts, was scarcely less so.

It will be remembered that the outbreak which began with a single case in Mr. Parry's flock, extended, before it died out, to eight other flocks. In nearly all

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† I say as a rule, because exceptions to it happen under the same circumstances, and in about the same proportion as in human small-pox and in the other contagious fevers. Professor Gamgee has lately recorded an instance of such exceptions occurring on so large a scale as to imply either some peculiar liability in the particular flock, or something spurious in the antecedent attack.

these instances, not only had there been no direct communication, but, in more than one, the flock which became affected secondarily was separated from the flock which gave the infection, by a wide space. One of these flocks I visited. The field in which the sheep were then pastured was at least three-quarters of a mile, as the crow flies, from the sheep that had communicated the taint. The two flocks, the owner assured me, had never been in closer proximity than this. In the natural dread of so costly a scourge, he, as well as all the other sufferers, had guarded his sheep with the most jealous care; but the disease was, nevertheless, transmitted. The case of Mr. Harding's flock, of Etchilhampton, was still more remarkable. "The spot where the sheep were folded" (I quote from an account in the *Veterinarian*) "was about a mile and a half distant from Mr. Parry's farm, and in the intermediate space were other farms occupied by flocks belonging to different proprietors, and every care had been taken to prevent either direct or mediate communication with Mr. Parry's flock. As an additional precaution, the sheep had been driven to the part of Mr. Harding's farm most distant from Mr. Parry's."

Equally memorable was the infection of Mr. Church's flock, whose farm at Hillswood is some fifteen miles distant from the site of the Allington outbreak. This gentleman's sheep had been pastured in a field bounded by the high road, and over this road sheep from the infected district had passed to and fro. This was, as far as could be discovered, the only connecting link between the flock and the original focus of the poison.†

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† On the 22nd of August, Mr. Neate of Allcannings, one of Mr. Parry's neighbours, sold two hundred lambs, at Marlborough fair, to Mr. Lonsley. Two days afterwards, these lambs were sent back. When I wrote this address, I had been led to suppose that this particular lot of lambs had not, at that time, shewn any signs of infection. I have since been informed by Mr. Neate himself, that six of their number were in the first stage of variola when they passed back through Hillswood from Lambourn, on the 24th of August. On that day, Mr. Church's sheep were folded on a spot about a hundred and sixty yards from the road over which the infected lambs travelled. For several weeks they had never quitted the field in which they then lay. Mr. Church, who has obligingly furnished me with these details, supposes that the taint was conveyed to his flock by his shepherd, who, attended by his dog, unwarily passed through the lot of infected lambs as they came along the road. There are, however, two great difficulties in the way of this supposition. In the first place, the six lambs affected with variola were in a stage of the disorder which is not generally believed capable of communicating infection. The very night before they had, in fact, been shut up in a yard with four hundred others;



The importance of these facts in relation to epidemics generally, will be readily seen. When events, at all parallel to these, occur in man, they are set down at once as altogether excluding the idea of propagation by communication of the morbid germ from the sick to the healthy.† And yet nothing can be more certain than that in the case before us the disease was propagated in this way. To argue the point at any length would be a waste of words.

The facts, first, that since sheep were first pastured on these uplands, this pest had never before appeared; and secondly, that the only sheep in all England that suffered were the neighbours of Mr. Parry's, and were affected long subsequently to his, are in themselves sufficient. These admitted, it becomes interesting to inquire in what probable ways the germ was transmitted from one flock to another. Several modes may be specified as having possibly intervened. The virus might have been conveyed—

1. By flies, or by starlings.
2. By men who had visited diseased flocks.
3. By sheep from the infected district.
4. By atmospheric dispersion, as it was cast off by the diseased animals.

Some have attempted to throw ridicule on the first of these supposed modes; but it was impossible to spend a day among the diseased flocks without seeing the great probability, to say the least, of its having had a share in the dissemination of the poison. From the disease being seated on the skin, the sheep were infested by flies and other insects to an extreme degree; all busy either in feeding on the variolous discharge, or in depositing eggs. The starlings, in their

and, of these four hundred, not one took variola. In the next place, Mr. Church's first case occurred on the 27th of August, only three days after the passage of Mr. Neate's lambs, whereas eight days are the shortest known period of incubation. For these reasons, it seems more than doubtful whether Mr. Church's sheep received their infection at all from this lot.

† Human maladies are, it is true, not often transmitted through the air—on a large scale, at least—over such wide distances, for the simple reason, that sick men do not live “in the open air”, like sheep, and are not massed together in the same way. But the difference is one of degree only. On the other hand, some of the most fatal and destructive of the epidemic diseases of men are propagated by discharges, which are often cast upon the open ground, and become the source of a widely diffused miasm. As these discharges are liquid, they are sometimes carried by gravitation to long distances, and the area of infection is thus greatly enlarged.



turn, came in quest of the larvæ of the flies. On approaching every fold of variolous sheep, a swarm of flies, and a great flight of starlings, rose into the air from their backs. As it is probable the attentions of neither were confined to the diseased flocks, it is easy to see how the virus might have been conveyed from one flock to another by their agency. That the disease may be carried from flock to flock by men has long been proved.

Professor Simonds related to me two decisive instances of the fact, which had fallen under his notice in former epidemics. Numerous others are recorded in works on "clavelée".

As Mr. Parry's flock was at first, naturally enough, an object of great curiosity to his neighbours and was visited by many of them, it is quite possible that the disease may have been in part transmitted in this manner.

For reasons on which I have not now time to enlarge, it was pretty certain, however, that the poison was chiefly diffused through the air. This is no doubt the way in which the virns of human small-pox is mainly distributed, and the diffusion of the two diseases appears to follow exactly the same laws. The well-known fact that both spread most rapidly and widely in hot weather, and especially in the absence of continued rain, is best explained by this view.†

The result may be brought about in two different ways: first, by atmospheric dispersion of the dried crusts resolved into impalpable dust; and, secondly, by the poison being wafted gently through the air in the form of "*nebulae*"; to borrow Professor Simond's fine and suggestive expression—as it rises from the sheep's bodies.

Those who have had the good fortune to engage much in field-sports—a form of enjoyment equally invigorating to mind and body, and for men whose chief business in life is the observation and interpretation of nature, one of the best modes of training—will have no difficulty in conceiving this last mode of transmission. On a good scenting day, and with a favourable breeze, I have seen a pointer wind a covey which I had marked down a few minutes before,—and which

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† As regards human small-pox, this was first remarked by Sydenham, and has been verified by all experience since. Hurtrel d'Arboval states that variola ovina has been always observed to spread most in dry seasons. The absence of rain, I imagine, is the really important element.

had had no time to run,—very nearly the length of a long field. If the infinitesimally minute particles emanating at such a distance from some ten or twelve partridges, insensible as these particles are to us, can impinge on the olfactory nerve of the dog, with sufficient efficacy to enable him to recognise his game, and to excite his whole frame to spasmodic action, it is easy to conceive how, under favourable conditions of weather, the emanations from a large flock of sheep stricken with variola may be wafted by a gentle breeze through thrice that space, with full power to propagate the specific disorder.

Looking now, in a broad way, at the whole series of the events I have narrated, their interest is extreme, as showing, with singular precision and clearness, in what way and by what exact process of development, an exclusively contagious disease may, from a single first case, grow, in a short time, to an epidemic of large proportions.

As we have already seen, the disease eventually spread from the case of the ewe that lay dying by the hurdles, to eight other flocks, and many thousand sheep, occupying an area of several square miles, and extending into three counties. It is no objection to the facts that artificial propagation played a part in their production; for, had events been left entirely to their natural course, the spread of the infection would have been incomparably more rapid and wide.

Indeed, had not man intervened, had not the most stringent measures been taken to prevent the spread of the disorder, there can be no doubt that it would not have remained limited to the area to which it was restricted; but, as in all other countries in which the same precautions have not been adopted, would, like its congener, human small-pox, have overrun the kingdom, and become naturalised among us.

Now, what I wish you particularly to observe is this: that when events of this same kind occur in the case of man—when small-pox, typhus, typhoid, scarlet fever, or any other contagious fever, spreads thus widely and becomes epidemic—it is generally supposed that some new element has come into play, of an entirely different order from those which are in operation when the extension of the disease is confined to a single group. The case is not often, it is true, put in this distinct way. The phrases used are

more or less vague, like the ideas they represent. If nothing more were meant than that, when a contagious disease becomes epidemic there must be a concurrence of conditions favourable to its propagation by its known mode of multiplication, no exception could be taken to the view. But it is clear, from the terms in common use on this subject, that much more than this is implied. The two characteristics are put in direct opposition to one another, as things essentially different, if not antagonistic. Thus, small-pox, typhus, and the rest, are said, for instance, to be both contagious *and* epidemic. In the same way, variola ovina, the very disease of which we here treat, is said to be both contagious *and* epizootic. Even in their etymology, the two words express an antithesis.

Now, if this language mean anything, it means that when a contagious disorder becomes epidemic, the morbid agent has come into being in some condition, and by some mode of development, other than that which occurs when it is propagated by direct contagion from one individual to another.† That the contagious poison—to speak more plainly—*although known to breed in the living and infected body*, has, under some hypothetical influence of a general kind, been generated, in the epidemic season, by some totally different, and more pervading, source.

The events observed in Wiltshire are of incomparable value, as showing by data, which are scarcely inferior in severity and precision to those of the exact sciences, the entire fallacy of this view. For, be it observed, this epidemic in sheep was, in all essential things, the exact counterpart of the epidemics which infest mankind. There was the same evidence of growth from a small beginning until a large community was involved; the same commingling of cases in which the operation of contagion was evident, with others in which the connecting thread was lost in the mazes of a vague and manifold diffusion; and others still in which, from the nature of the events, under the common view of them, the very idea of contagion seemed to be altogether excluded.

Now, the strength of this case is, not merely that we see where and how the specific poison is actually

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† This is shown still more strikingly by the language of not a few writers, who altogether invert the true relation, and while admitting certain disorders to be contagious, hold that they only become so when strongly epidemic.

bred—not merely that we have ascertained by experiment how marvellously exclusive are the conditions attaching to its growth—not even that in its immeasurable powers of growth we recognise an adequate source for all that follows; but that we exclude the intervention of every other source by the overwhelming evidence of a thousand years of antecedent immunity.

Every other element was here before, but *clavelée* never; the germ of the disease is introduced, and the result is what we witness. The history of human small-pox teaches, indeed, the same lesson; but in this outbreak of ovine variola we read it in characters still more plain.

To say that in the epidemics of contagious disorders other conditions may not intervene, in an important way, in the common result, would, of course, be absurd. But it is essential to all clear views of these high and complex questions, to see with the utmost clearness that these conditions are secondary only, and act solely in promoting the growth and dissemination of the one essential thing.

When locusts, from being more an object of interest to the naturalist than a serious cause of alarm to the grower of the mulberry and the vine, rise into swarms which darken the air, and sweeping beyond the bounds of their native habitat destroy the vegetation of half a continent, we all know that there must have been an unusual concurrence of conditions favourable to the multiplication of the insect. But we all know, with the same certainty, that it is the breeding power of the locust itself that has alone brought these countless hosts of winged enemies into the field. And so in disease. When small-pox, scarlet fever, or typhus, from being sporadic only, burst out into great epidemics, we all know that there must have been a concurrence of conditions favourable to the development and diffusion of the contagious poisons on which these diseases depend. But we all know with the same certainty, or rather, we all *ought* to know, that it is the reproductive power of these diseases themselves, which has alone brought into the world the new stock of the poisons from which they spring.

Three other topics remain on which a few words must be said before I conclude. What precise relation does variola ovina bear to human small-pox? How came it to spring up in Wilts? What were the

means by which, after it had risen to so great a head, it was finally extinguished?

The relation of the disease to human small-pox, interesting as it is, need not detain us long. In the introductory part of this address, we have seen how curiously close, as well as various, are the points of analogy between them. The name assigned, by common consent, to the ovine distemper shows better, perhaps, than anything else how striking they are. It is impossible, in fact, to see the malady—as you may yourselves, in part, judge from inspecting the accompanying drawings—without the idea of small-pox at once starting to the mind. But to presume upon actual identity in a case like this, on the ground of mere resemblance in outward characters—however accurate this resemblance may be—is to proceed on a false principle.

In the absence of other evidence, indeed, we must be content with such light as evidence of this order affords. But, in the present instance, there is another test that touches the root of the matter much more nearly.

These two diseases—the *variola ovina* and the human *variola*—are both things that breed. Each perpetuates its own species. If they be not two species, but one, it is clear, therefore, that in some way the one must have been derived from the other.

Now, tried by this test, the case seems to be decisive against the identity of these two maladies. We have already seen that man is proof against the ovine disease. He neither takes it in the natural way, nor can he be inoculated with it. The sheep is equally proof against human small-pox. Had human small-pox the power to generate this disease in the sheep in the natural way, British flocks would not have enjoyed so long an immunity from it. The inoculation of the sheep with small-pox virus is, on the other hand, always abortive; or, at least, produces nothing of the nature of *clavelée*. This, perhaps, would have sufficed of itself to decide the question. But there is another experiment, which, were it only for its subtle and delicate interest as a piece of scientific evidence, and for the train of associations it wakes up in the mind, I cannot withhold.

Vaccination, as we all know, offers a specific protection against human small-pox, which is all but

complete; against ovine small-pox it offers no specific protection at all. It has been proved by experiments on an enormous scale, performed under every condition to insure accuracy, that vaccinated sheep, when afterwards exposed to the infection of *clavelée*, take the disease in large proportion in the natural way; and that, when inoculated with it, they not only incur the usual consequences, but suffer quite as severely as unvaccinated sheep.†

Until evidence to the contrary shall arise, the conclusion, then, seems to be inevitable, that variola ovina and human small-pox, closely as they resemble one another, are of distinct species. They are as two kinds of thistle—as one sort of mushroom to another sort—or as two species of algæ—like almost to identity in looks and outward guise, identical in all their laws of growth and being, but yet specifically different. This being so, the close resemblance between these two diseases becomes a matter for new interest. That, being so like that, to judge from first impressions, one would almost swear they were the same thing, each should have, against the other, such specific limitations of growth and power, is a fact of the deepest significance.

It is one more fact to show—if further proof were needed—what intensely specific things these contagious principles are; and, although we are in the habit of speaking of them as so many *poisons*, how different in essence they must be from our idea of poisons, when the word is used in its chemical sense. It only adds to the interest to know that the example here adduced is an example of a general fact.

I have endeavoured to illustrate the relation of human to ovine variola by a parallel drawn from organic nature. This parallel might be carried much beyond the present case, with strict adherence to

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† There is, indeed, evidence to render it probable that for some weeks after vaccination sheep are somewhat less prone to take *clavelée* in the natural way; but there is clearly nothing specific in the protecting influence. Louis has remarked that typhoid fever hardly ever occurs in persons who may at the time be the subject of any other morbid disturbance. The two facts are, probably, of the same order. The failure of vaccination as a preventive of *clavelée* is the more important, because it produces in the sheep a disease which would appear to be the exact equivalent of vaccine. Huttrel d'Arboval states that lymph taken from the resulting vesicle, and used for vaccination, produces the normal effects of that operation in man, and affords the same protection against small-pox.

nature and truth. For, if we extend our survey from the contagious diseases of man to those of the lower animals—not to speak of those of plants—we shall see that, as in the living flora there are tribes of thistles, of mushrooms, and of algæ, so among these morbid principles there are whole tribes also, bearing exactly similar and equally close resemblances one to the other, and yet specifically different.

In studying these things on an enlarged scale, we become, in fact, gradually aware that the singular agents which lead this parasitic existence, constitute a whole order to themselves: in their mode of growth and perpetuation, in their likenesses and differences, as, indeed, in many other things, the exact reflex of the organic types that people the world without, and on whose substance they prey. How have they all come into being? What, for instance—for the question will recur—is the relation between these two forms of variola, which in the drawings here look so wondrously alike? Although specifically different, may there not after all be some genetic connection between them? May not the one possibly be derived from the other by some such metamorphosis as that which naturalists begin to suspect is the key to that mysterious resemblance which runs through the organic types of the outer world? Or, rather—for this would probably be the truer way of putting the question—may they not be derived from some third, different from either, but the common progenitor of both?

These are problems of the future; problems of deep and various interest, but which must be postponed in the presence of the more pressing questions of the hour and day.

The origin of this remarkable outbreak in the Wiltshire flocks now comes to be considered. In regard to this point, I may as well state that the obscurity which hung over the first introduction of the pest is not yet wholly cleared away. At first the event seemed to be quite unaccountable. Mr. Parry had made no recent additions to his flock; and the seeming seclusion in which his sheep had for some time lain, appeared to shut out the idea of infection from any extrinsic source. These being the circumstances of the case, this outbreak was at once eagerly cited, by more than one writer of the dominant school in these matters, as a glaring instance of the spontaneous



generation of a specific eruptive and contagious fever.†

This was the theory. The fact, divested of all theory, was simply that the specific germ, whatever its origin, which infected the first sheep, had not at that time been traced to its actual source. But, between inability to trace a minute and impalpable germ on the one hand, and proof of its spontaneous origin on the other, the distance is wide indeed. How wide, let mildew and mushroom, and all the countless kingdoms of organic types that breed by minute and impalpable germs, bear witness. If the evidence brought forward to show that this sheep-fever had sprung up spontaneously were of any worth, evidence of exactly the same order might be adduced to show that all these things spring up spontaneously too. Not only, however, has the spontaneous figment no real basis of its own, but the presumptive evidence against it, derived from the nature and history of the disease, is overwhelming. We know, in fact, how and where the poison of *variola ovina* is bred, and we have seen how incomparably specific and exclusive are the conditions attaching to its evolution.

Those who have weighed well what was said on this head will require, if I mistake not, something more than mere negative evidence to convince them that this is a poison which can be bred *de novo* out of the common conditions of sheep-life to be found in a Wiltshire farm. Against such a conclusion there is at once to be placed the decisive testimony of a thousand years of prior exemption. Since the Saxon first fed his flocks on those Wiltshire downs, this scourge had never once made its appearance there. Until nineteen years ago, the same might be said of England at large, under all the countless varieties of season, breeds, and sheep management, through these long, long centuries.

Enormous as is the weight of this fact as an argument against spontaneous origin, even when taken singly, its full force can only be appreciated when we contrast this immunity of ages with the frequent infraction of it during the short seventeen years which have succeeded to them. Of these two facts, each gives

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† I speak here of *medical* writers, commonly so called. I must do the two eminent veterinarians who had charge of the diseased flocks the justice to say, that they neither of them, for a moment, gave any countenance to the popular cry in favour of spontaneous origin.



the interpretation of the other. *Variola ovina* was unknown among British flocks until seventeen years ago, because up to that time we virtually excluded the sheep of those countries in which the disease prevailed; it has broken out thrice since, because since that time we have admitted these sheep in enormous numbers and without restriction.

As regards the question of origin, the situation of this last outbreak was not without its significance. "Scotch farmers, we trust," says a Scotch writer, "may never see this disease: they are out of the way of the imported sheep." London is, in fact, the port through which they nearly all come in; and it will be observed that, of the three outbreaks of the pest which have already occurred in this country, not one has happened in Scotland or Ireland, or even in the north of England, but all in the south, and in those very districts which recruit their flocks most largely from the London market.

These considerations, which from the first were accessible to any one who would lay his mind open to them, might have prevented, one would have thought, that hasty resort, on the occurrence of the first difficulty, to a baseless and extravagant hypothesis, which it is so humiliating to think of, and which must look so strange in the eyes of men who cultivate the exact sciences. Since then a new fact has come to light, which shows how entirely premature such a proceeding was. About a fortnight or three weeks before this Wilts outbreak, a lot of foreign sheep infected with variola were sold at Smithfield to go into the west. This being so, two points in the topography of Mr. Parry's farm, brought into prominence by the local discussions on the origin of the outbreak, acquire special significance. On the first, Professor Gamgee lays great stress.

The farm, which, as we have seen, is situated at the foot of Beckingham Downs, was in part inclosed, in part open down. Now these downs are traversed in various directions by great sheep-tracks or driftways, which emerge, it is said, in the very heart of the open part of the farm. Through them sheep are driven in large numbers, partly for the sake of the wayside herbage, and partly for the evasion of tolls. Many instances have occurred, Professor Gamgee says, of the spread of contagious disorders, such as scab, the foot and mouth disease, rot, etc., from these infected flocks passing over the downs along the Wans Dyke—

the oldest of these tracks; and he suggests that it is more than probable that the sheep-pox was brought to Allington by the same secret and devious paths.†

The next point, which was, I believe, first brought to notice by Professor Simonds, is probably still more important. For some weeks before the beginning of the outbreak, Mr. Parry's sheep had been confined to

† I subjoin Professor Gamgee's masterly account of the topography of Allington,

"The farm of Allington, tenanted by Mr. Joseph Parry, stretches over St. Anne's Hill, or Tanhill, which is the centre of an extensive sheep district. It is also the locality in which there is an extensive sheep fair held annually on the 6th of August. Skirting this hill, and through the heart of the district about to be described, is the celebrated 'Wan's, or Devil's Dyke', one of the divisions of the old Saxon Heptarchy, and now levelled in some parts, but prominent at others. This Wan's Dyke takes a somewhat serpentine course from east to west. Standing on the Wan's Dyke at Tanhill, and circumscribing a circle with a radius of six miles, an area is embraced of about 70,000 acres of land resting on the chalk formation, with considerable tracts of the upper green sand, and the soils are proverbially healthy for sheep. Over this district there is in many parts one sheep to the acre, and the total amount of stock was computed in July to be about 50,000 sheep.

"The system of management consists in folding the sheep on fallow land or green crop, according to the season, extent, and quality of the down, to which the sheep are driven every morning from April to November. Each farm has, therefore, a certain amount of arable ground in the vale, and a strip of down on the hill. These strips of down are often connected with the arable land by a mere right-of-way or small strip of down, and the downs are limited for each farm by some faint undulation or mark, which we often fail to recognise, and which shepherd and farmer alone can define. Practically, the downs are quite unenclosed, though legally we understand that the land apportioned to each farmer is looked upon as fenced, so as to protect him from intrusion, and is considered enclosed ground. Our readers may imagine in what sense this may be accepted, when we tell them that we have ridden and driven for miles on the downs, straight through all the infected farms, without deviating right or left, and without passing ditch, hedge, stone wall, or gate.

"Standing on an elevated spot, the flocks are seen crammed in every part, moving side by side, one after the other, crossing each other's track, and affording ample opportunities for communion amongst the shepherds.

"The district is traversed in all directions by driftways, so that drovers can pasture their sheep on the downs for days, and go from Bristol to London with the payment of a single toll, or from Southampton to Ilsey, etc., in the same way. An extensive dealer has assured me that many hundred sheep driven for many days along the Wiltshire downs cost for travelling expenses 4s. a day. No money is needed for food, shelter, or tolls.

"There are some notorious dealers who have no farm or down on which to keep their flocks. They pick up odd animals at a low price, here and there, and drive over the downs, where they sleep, and move gently backwards and forwards on the pretext of travelling, but in reality getting food for their flocks. Many instances have occurred of the spread of contagious disorders, such as scab, the foot-and-mouth disease, foot-rot, etc., from these infected flocks passing over the downs along the Wan's Dyke."

two meadows in the lowland part of his farm.† At first sight, nothing could seem more complete than the insulation of these two fields. On looking a second time, an attentive observer would not fail to note that they were bounded through their whole length by the Kennett and Avon Canal. Along this great waterway trows are slowly dragged through all hours of day and night. In their multifarious cargoes, animal manure, and the raw materials from which animal manure is made, including skins, bones, and other offal, are said to figure largely. Now, if it be true, as reported, that a lot of the variolous sheep, just referred to as having been sold at Smithfield a few weeks before, died of clavelée on the banks of the Avon lower down, the appearance of this disease in a flock browsing on the bank of the Kennett and Avon Canal is no mystery. Under any view, it is extremely difficult to believe that the appearance of the foreign pest in these two particular fields had nothing to do with their proximity to a highway used for such traffic.

Here the case stands at present. Whether or not it will ever be more fully cleared up, I do not know. Probably not. In the present temper of the farmers of Wilts as to sheep's small-pox, the man who should be proved to have been even an unwitting instrument in conveying it to their flocks would not be likely to have a very pleasant life for some time to come. Under the circumstances, there is too much reason to suppose, therefore, that any information bearing on this point which might be forthcoming, would be suppressed by the only persons that have the power to give it. Meanwhile, we may rest assured that, if we have hitherto failed in tracking the infection home, the failure is not due to any real want of continuity in the thread, but simply to the inherent difficulty of following unbroken the course of

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† In a paper by Mr. Gamgee, in the July number of the *Edinburgh Veterinary Review*, I find the following passage:—"The lowland portion of the Allington farm is skirted by the canal, and it is said that the sheep were near this canal when the disease broke out. I find, however, that the first case occurred amongst a portion of the flock that had been driven daily to the down for about a week. My authority is the shepherd who drove them."

When I was Mr. Parry's guest at Allington, the origin of the outbreak was the subject of much conversation; and at that time Mr. Parry's own impression certainly was, that for some weeks before the appearance of the disease, his flock had been confined to the two meadows in question.

such a gossamer. As for myself, I confess that I am quite indifferent whether the broken ends which we now hold be ever reunited, being of opinion that in the present state of science, when we see a case of *variola ovina* spring up, we are as much entitled to infer that the germ from which it came was derived from an antecedent case, as we are to draw the same inference in regard to human small-pox.

If, however, any should be disposed to cavil at the fact that the origin of clavelée in Wiltshire has not yet been made out in its every link, I would point to the two former appearances of the disease in England, in which even this last ground of objection is taken away. These first two outbreaks, indeed, as being much more wide-spread, and as offering a far greater number and variety of instances in which the communication from flock to flock could not be traced, were, if possible, even better illustrations of epidemics generally than that we have been endeavouring to follow. In both, as I have said before, the exact trail of the infection was tracked from the foreign seaport to the two farms in Berks and Norfolk, from which it afterwards spread so widely.

The measures by which, after it had risen to so great a height, this pest was finally suppressed, were simple enough. They were founded, in fact, on the single principle that *variola ovina* is an exclusively contagious disorder, to be extinguished only by preventing the spread of contagion in all possible ways. Perfect insulation of the diseased flocks for several months, as enforced by Order in Council; instant separation of the sick from the healthy in the infected flocks themselves; the immediate slaughter and burial of badly diseased animals; the disinfection of tainted homesteads, and of the tainted fleeces of the sheep—this was the code of measures brought into action against this new enemy. Carried out with the vigilance and untiring energy which are often so sadly wanting when the interests of health only are concerned, but which never fail when the interests of the pocket are largely at stake, they perfectly succeeded. Before the beginning of November, this scourge, which from the ewe that lay dying by the hurdles had extended to some eight or ten thousand sheep, had come to an end; and, by measures directed solely against contagion, British flocks were once more delivered from a great peril, and the nation

from incalculable loss. That the result should thus answer to the theory was the only thing needed to put the seal to the history, and to make the whole case logically complete.

Thus have we seen a great epidemic unfold itself, from its first small beginnings to its final extinction, in which the *rationale* of the whole series of events is made as clear as day. In these events, a specific germ, endowed with the faculty of immeasurable multiplication, open to various modes of untraceable dissemination, and having power over a single living species, is the only new element. In the incalculable minuteness of this germ, and in its equally incalculable faculty of growth, we find a key to all the phenomena. Manifold, complex, subtle, and intricate as the results are—in all these things so characteristic of epidemics generally—it comes before us with all the force of absolute demonstration, that they all fall under the single great law of the evolution of a specific type by continuous succession. What, above all, in this spectacle, is most to be prized, is the admirable clearness with which this great truth comes out. As we see with what precision, one by one, all the essential data bearing on our problem are elicited by experiment or made plain to observation; as we observe how the few remaining ambiguities which experiment and observation leave untouched are at once swept away by the great fact that the disease before us, although prevalent from all time in other countries, is new to our own—we seem to have left the vague realms of physic, where a balance of conflicting probabilities constitutes for the most part our nearest approach to truth, for the precise and rigorous demonstrations of the physical sciences.

Not less valuable is the whole history of this disease, for the signal record it bears against the doctrine of spontaneous origin as applied to contagious disorders. Resting on purely negative data, this doctrine is a mere figment of the mind.

The offspring of a crude and early stage of scientific culture, it has come down to us as a tradition of that phase so familiar to the student of the history of science, in which things are thought to be what they first seem, and the outward semblance is taken to be the real relation. In the nineteenth century, it is an anachronism. Among the contemporaries of Eschricht, Owen, Milne Edwards, Pasteur, and Carpenter, it should have no place.

It is to the last degree significant that wherever, in its application to this group of diseases, the question can be tried by experiment, or by the light of geographical distribution, or of data equally binding, it receives a decisive negative. Only in connection with the types that cannot be so dealt with does it still linger. Discountenanced by the whole analogy of nature, shown to be untenable in every case in which definite evidence can be brought to bear, this belief in the spontaneous origin of specific contagious diseases has already received its death-blow, and, like the strictly correlative belief in the spontaneous generation of plants and animals, is doomed soon to take its place among the things of the past.

This address, already too long, would, nevertheless, fail of all its purpose, if I brought it to a close without applying the truths it was intended to illustrate to the contagious fevers of our own race. For the present, I will content myself with a single example.

The fever I shall take is one with which you are all familiar; the typhoid fever of man. Like variola ovina, this, too, is a contagious fever, having a period of incubation, and occurring but once in life; a fever which multiplies as it goes, and is marked by a specific eruption. For, although the character of which I speak, in the last instance, is seated on the intestine and not on the skin, you cannot doubt, if you will look at the drawings and photographs here exhibited, that such is its true definition.

Compare these drawings for a moment, with unprejudiced eye, with the drawings by their side, representing the eruptions of human and of ovine variola; remembering the while, that in each case you have before you the one and only specific mark of a contagious fever, and you will not, I think, fail to see that, in all, you are looking on phenomena of the same order.

But the several characteristics just enumerated are the highest conceivable by which two diseases can be related. Nothing can show more forcibly how entirely they touch and spring out of the essence of the morbid agent in each case, than the fact that they are found alike in the animal and in man. These two things, the ovine and the human fever, are, clearly, in the highest and most intimate sense of the words, things of the same sort. In all their modes of being they follow the same law. They are members of one



family, in fact, as much as two kinds of mushrooms are; and, I may add, in the same sense.

Knowing the law of propagation of the one, we may apply it to that of the other, with the same certainty as we apply the law of propagation of one kind of mushroom to that of another.

If typhoid fever, like *variola ovina*, has a period of incubation—an interval, that is to say, in which, after the reception of the germ, no appreciable morbid phenomena occur—we have learnt by experiment what this implies.

We know that in the contagious fevers this most significant of characteristics depends on the fact which, in one of these two cases, is *patent to the eye*, that these diseases are caused by poisons which only develop their effects by growth within the living body, from a germ which, in the first instance, is too minute to exert any sensible action upon it. By the surest of inductions, therefore, we become possessed of the great cardinal truth, which I have already enunciated elsewhere, that the human body is the soil in which the typhoid poison breeds and multiplies, and that the fever itself is the process by which it is evolved.

Once more, if typhoid fever, like *variola ovina*, occur, as a rule, but once in life, we know—for in one of the two we have ascertained the fact by experiment—that this is because, even in the living body, this poison cannot breed a second time. By the help of the same analogy, we may be equally sure that it never springs up spontaneously, but is perpetuated solely by the simple law of continuous succession.

Lastly, we may assume with the same certainty that the intestinal eruption represents the chief, if not the only out-come of the specific poison, since it is from the *variolous* eruption, the exact counterpart of this, that we charge our lancet when we proceed to the inoculation of the ovine disorder. But if so, what an opportunity is here! This typhoid poison, thus cast forth in a liquid form to infect the ground and the sewer, slays every year, in England alone, its eighteen or twenty thousand men. As it issues from the body, it is entirely within our power. By destroying it we may bar the succession, and throw the impenetrable shield of science between the poisoned shafts and the next group of victims.

It is easy to see how many difficulties may stand in the way of the universal and perfect accomplishment

even of this simple act. The extent to which it may be enforced depends much on ourselves. If we put only half the energy into the work which the Wiltshire farmers displayed in preventing the spread of the clavellee among their flocks, we shall soon reduce the twenty thousand who perish annually from typhoid fever in England to a low figure, and pave the way to the speedy and entire extinction of the pest. For myself, I never see the exuviae which contain its deadly seeds cast carelessly upon the world, without thinking how many homes may possibly be made desolate by that single act, and how great is the inconsistency which passes Acts of parliament, and imposes heavy penalties to prevent the destruction of some five or six hundred lives by arsenic and other poisons, and yet allows a poison which destroys its twenty thousand every year, to work its will upon the people.

One word more, and I have done. I said, that in applying the case of clavellee to the illustration of our own diseases, I would confine myself to a single example. But it is obvious, that the principles which that disease brings so clearly into view, apply with the same strictness, to the propagation of the whole group of contagious fevers, and with greater or less promise of success to their prevention also.

If, instead of allowing our minds to be diverted by the baseless and obsolete notion that these fevers may spring up spontaneously, or by the unscientific idea that they may be generated by filth or other external conditions, we concentrate our attention on the great truth that it is in the living body only, that the specific poisons on which they depend are bred and perpetuated, we shall soon learn ways greatly to abate their ravages.

If I might be allowed to express the one sentiment that fills my own mind in relation to this subject, it would be this:—that it is high time we should join, with concerted aim and more earnest purpose, in efforts founded on this principle to deliver our fellow-men from these great scourges. To this course we are, in fact, moved by every high consideration that can impel men to action.

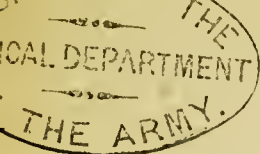
These fell disorders are always crossing our path. They defy our art, and seem to mock our power. Their presence is a standing humiliation to us. They cause the greatest and the bitterest tragedies we are called upon to witness. They leave desolation and



mourning and widows and orphans in their track. Take the single case of scarlet fever, and what heart-rending scenes does not its very name evoke. Let this terrible fever sweep through a community and one seems to have for months ringing in one's ears "the voice of Rachel weeping for her children, and will not be comforted, for they are not."

Unhappily, this great Hydra of contagious diseases is not a thing that can be slain, like the Hydra of old, in single combat. Thanks, however, to the power of human genius we have already discovered that of its myriad heads, some at least are mortal. And, although to no one of us will ever be given the strength to repeat the exploit of Hercules, we may hope that, when science has forged the fitting weapons, by banding together as one man we may yet rid the earth of the monster.





ON THE

OCCURRENCE

OF THE

MALIGNANT PUSTULE

IN ENGLAND.

BY

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## MALIGNANT PUSTULE.

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IN France, Germany, Russia, Lapland, Sweden, Italy, and other parts of Europe, under the characteristic name of Malignant Pustule, a disease has long been familiarly known and described, which proves fatal every year to a large number of persons.

Beginning as a minute vesicle, which is seated always on some uncovered part, its special character is to excite a peculiar form of gangrenous inflammation, which, spreading rapidly from the point first affected to the neighbouring tissues, gives rise to local changes of very uncommon aspect, and finally destroys life by general infection.

A disease calculated, by so much that is striking, to arrest attention, has, naturally, been made an object of inquiry by many eminent observers.

Among other distinguished men, Vallisneri, Solander, Pallas, Fournier, Thomassin, Chabert, Kausch, Malacarne, Linnæus,\* Glanström, Enaux and Chaussier, Leuret, Delpech, Rayer, Bourgeois, Salmon and Maunory, Hoffmann, and Heusinger, may be specially

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\* Linnæus, who was himself attacked by the disease, but happily recovered, was the first to give authentic evidence of the existence of malignant pustule in Lapland.

mentioned as having each contributed something to its history.\*

The following important points appear to be established by the investigations of these and other writers:—

1. That the malignant pustule in man is identical

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\* *Vallisneri*. Lettere spettanti alla storia medica é naturale. Padova (1713). Also, Nuova idea del mal contagioso de huoi. (1714.) *Solander, D. Chr.* Furia infernalis. Nov. Act. Upsal. Tom. i, p. 113. (1773.) *Pallas, P. F.* Vergleichnung einiger in Schweden, Russland, und Siherien, und den daran grenzenden Wüsteueien hemerkten tödlichen Krankheiten, die man füglich unter den Namen, Brandheulen, zusammenfassen kann. Neue nordische Breitr. B. 1, p. 113. *Fournier*. Observations et experiences sur les Charhous mslins. Dijon: 1769. *Thomassin*. Dissertation sur le Charhon malin de la Bourgogne, ou de la pustule maligne. Dijon: 1780. *Chabert*. Description et traitement du Charhon. Paris: 1780. *Kausch*. Dio in Köuigreich Preussen, und hesonders in Herzogthum Warschau endemische, schwarze, Blatter. Hufeland's Journal. B. xxxiii, c. p. 38, d. p. 49. 1811. *Malacarne*. Del Carbonchio de Buoi e della febbre carhonziosa nel Bestiamie e negli uomini. Bassano: 1797. *Linnaeus*. Amœnitates Academicæ. Vol. iii, p. 322. *Glans-tröm*. Dissertatio de pustula livida. Regiomonti: 1824. *Enaux et Chaussier*. Methode de traiter les morsures des animaux enragés, et de la vipère, suivi d'un précis sur la pustule maligne. Dijon: 1785. *Rayer*. Traité des Maladies de la Peau. Article, Pustule Maligne. *Bourgeois*. Memoire sur la Pustule Maligne. (*Archives Générales de la Médecine*. 4me series, t. 1, p. 172.) *Salmon et Maunory*. Memoire sur l'inoculation de la pustule maligne. (*Gazette Médicale*, 1857.) P. 184. *Hoffmann*. Der Milzbrand oder contagiöse Karfunkel der Menschen. Stuttgart: 1827. *Heusinger*. Die Milzbrand-Krankheiten der Thiere und des Menschen. Erlangen: 1850. Some of these authorities I have studied in the original. For my knowledge of the rest I am indebted to Heusinger's elaborate and comprehensive treatise. The three works whose titles are subjoined, and which stand among the first in Heusinger's catalogue, also deserve special mention, as showing how far back the records of this malady go, and at what an early period the disease in man was identified with that in the animal. *Tossi a Serra*. De anthracæ seu carhunculo tractatus. Venet.: 1576. *Chr. Perez de Herrera*. De carbunculis animadversiones. Pintix: 1604. *Troilo*. Lancetta di Pestilenza commune ai bruti e di contagio mortale, dell' uomo. Venezia: 1632. Fol.

with, and derived from, the eminently contagious disease which, under the name of "charbon" (*Germanicé*, "milzbrand", spleen-gangrene) or (in sheep) "sang", has prevailed from time immemorial in various continental countries, in oxen, sheep, horses, and other animals.\*

2. That the disease may be communicated to man from the animal in the following ways:—

a. By direct inoculation, as in the case of butchers, farriers, skinners, herdsmen, drovers, and others, in whom accidental inoculation with it appears to be an event of no uncommon occurrence in the countries where "charbon" is most rife.

b. By means of the skin, or simply by the hair of diseased beasts; modes of communication of which many decisive examples are on record. Also, through contact with the bones, the hoofs, and horns, and the fat and tallow of animals dead of "charbon."

c. By eating the flesh of animals killed while affected with it, as also by using the milk and butter of infected cows.†

\* Indications of the occurrence of this epizootic extend back to a remote antiquity. Not to mention the murrain described in the ninth chapter of Exodus, by which Pharaoh's cattle, horses, asses, and sheep, were destroyed, and which by most writers is thought to be identical with "charbon" or "milzbrand," Heusinger considers it almost certain that the disease described in the first book of the *Iliad* (l. 43—52), that referred to by Ovid in his seventh *Metamorphosis* (l. 523—660), various epizootics mentioned by Livy and Dionysius Halicarnassus, and lastly that delineated by Virgil in the first and third *Georgics* (l. 464—470) respectively, were of the same nature.

† A remarkable example of the communication of the disease by the milk of an infected cow was related by Chisholm in his account of the epidemic which occurred in Barbadoes in 1795. The malady was rife on the plantation of Mr. Cummin, and carried off more than fifty head of cattle, beside a considerable number of negroes who

d. And, lastly, by insects which have been in contact with the bodies or carcasses of diseased cattle; a mode of communication obviously difficult to demonstrate, but in proof of which numerous cases—some, apparently, entirely free from ambiguity—are recorded.

3. That in the countries where “charbon” prevails, concurrently with the cases of malignant pustule which are the observed result of direct inoculation, other cases occur in which the vehicle of the poison cannot be identified.

4. That these cases have, in common with the rest, this significant peculiarity: that the disease is always seated *on some part of the person which is habitually uncovered*.\*

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had partaken of their flesh. While the epidemic was at its height, one of Mr. Cummin's children, a little girl three years old, took one morning for breakfast so much milk that scarcely any was left for the rest. Unfortunately, this milk was furnished by a cow which at the time was suffering from the murrain. Four days afterwards, the child was seized with all the symptoms of the prevailing malady, including malignant carbuncles identical with those exhibited by the negroes who had eaten the diseased meat. Her life was saved with difficulty; and a deep scar on her left arm remained to mark the nature of her illness. (Chisholm, on *Lues Bovina Introtropica*, *Edinburgh Medical and Surgical Journal*, vol. vi, p. 36.) It is remarked by more than one writer, as a curious fact, that, in milch cows, the secretion of milk often continues for a considerable time after the onset of the malady.

\* The few exceptions to this rule which do occur only add to its significance. Such, for instance, is the interesting case lately recorded in the *Lancet*, by Mr. Harper of Holbeach, in which a man who was tending diseased sheep inoculated the prepuce with his soiled hands. Many instances of this particular accident are recorded by foreign writers. Heusinger relates a case of malignant pustule in the instep, but it occurred in a boy who always went barefoot. In the epidemics which have occurred in the West Indies, when the disease attacked the blacks, who were, indeed, its chief victims, the pustule appeared in the most various parts of the body. I need scarcely add that these men habitually work in a state of almost complete nudity.



5. That in animals, and in oxen especially, the action of the specific poison by which the malady is caused is even more virulent than in man; as shown, in the first place, by a more speedy death; and, in the next, by the more rapid spread of gangrene, and by the extrication on a large scale, while the animal is yet living, of fœtid gases in the tissues of the part affected.

6. That the contagious property is possessed in the highest degree by the lymph of the characteristic vesicles; and, next to this, by a peculiar exudation (the so-called "humor anthracicus") which occurs in the cellular tissue of the affected part, in that of various parenchymatous organs, and sometimes, also, in the serous cavities of the chest and abdomen.\*

7. That the malignant pustule, when contracted by man, may be communicated by contagion to other men, or back to the animal by inoculation.

It would be out of place here to give, in detail, the evidence on which these conclusions are founded. I may, however, state that the identity of the malignant pustule

\* Greve believes the virulence of this exudation or carbuncle juice to be much greater while it is yet warm, and immediately after the death of the animal. On this point, he makes the following remarkable statement:—

"Ich sah eine grosse Menge am Milzbrand abgestandener Kühe und Ochsen von Abdeckern abledern, ohne übler Folgen für diese; aber sie lederten die Cadaver *erkaltet* ab und ihre Hände und Arme waren ohne Verwundungen. Sobald sie mit verwundeten Händen die noch warmen Cadaver behandelten, trugen sie allemal die gefahrdrohendsten Carbnukeln davon. Furchterlich wirkte das noch warme, gelbe, jauchige, und stinkige wasser in der Bauchhole des krepirten Fisches. Alle Hunde die davon aufleckten krepirten fast auf der stelle. Ich sprüzte ein paar Tropfen dieser warmen Jauch in das Auge einer Taube, und 3 Stunden nachher warsie todt, ebenso eine Ente welcher ich ungefähr einen Thelöffel davon in den Halse erguss. (Greve, *Erfahrungen und Beobachtungen*, i, s. 48.)

with the "charbon" of cattle—already, perhaps, sufficiently established by the countless cases of accidental direct communication, has lately received its crowning proof, in the reinoculation of the disease, with all its specific characters (including the power of indefinite propagation by the same process) from man back to the animal. (*Gazette Médicale*, 1857, p. 684, Salmon and Mannory.)

Some of the facts which show that the virus may be conveyed by the hair of beasts are very striking.

Trousseau, for example, relates that in two factories for working up horsehair imported from Buenos Ayres, and in which only six or eight hands were employed, twenty persons died in the course of ten years from malignant pustule. This distinguished teacher had himself the charge of three cases from the same establishments, in which life was only saved by severe canterisation. (*Gazette Médicale*, Février, 1847, No. 4.)

Rayer states that in the course of three years, while he was attached to the Hospital of St. Louis, he had to treat eight cases of malignant pustule; and adds that all eight came from an establishment in the immediate neighbourhood for the manufacture of Russian hair. (*Traité des Maladies de la Peau*. Article, Pustule Maligne.)

I think it is the same writer who records the still more remarkable case of three persons who were all attacked by the disease after cleaning some hair that had for many years served as the stuffing of an easy chair.

Two other facts may be mentioned here, in addition to these, which tend to show that this virus, like the other contagious poisons, when once in the dried

state, may retain its powers for indefinite periods of time.

It is stated by Gerlach that some straw on which, three years before, some beasts dead of "charbon" had been flayed, on being brought into a shuppen, infected with the same disease the sheep that were folded in it.\*

In Caspar's *Wochenschrift*, Nicolai gives the history of a tanner who died of malignant pustule of the face. After full three months, the daughter of this man; and then her brother died of malignant pustule also. (Caspar's *Wochenschrift*, 1833, p. 268.)

The propagation of the disease by flies which have previously been in contact with animals affected with charbon appears to be equally well established. As this, however, is a point to which I shall have to return, I will not dwell further on it here.

Whatever the way in which the pustule may have been contracted, one thing appears certain, and that is, that in man, in the immense majority of cases, it is at the onset local only; the general poisoning which ensues being due to the after diffusion of the morbid changes and products engendered in the part first affected.†

This capital point in its pathology may be inferred not only from the order in which the morbid phenomena succeed one another, but still more clearly from the de-

\* Gerlach, Die Blutseuche der Schafe in Rücksicht der Ursachen. *Magazin f. Thierheilk.* B. xi und xii. See Heusinger, p. 62.

† I say "in the immense majority of cases," because in some few instances in which the disease is caused by the ingestion of infected flesh or milk, the poison becomes absorbed at once into the blood, and leads to a general infection which precedes any local mischief.

cisive fact that the early destruction of the diseased part by caustic not only often prevents the development of the constitutional disorder, but in many cases issues in perfect and immediate cure.\*

The history is, in short, that of a specific animal virus, which, implanted by inoculation in a given part, sets up there a series of malignant zymotic changes, which are propagated thence to the whole system.

From this summary it will be seen that this remarkable disease has not only been closely studied by a great number of continental naturalists and physicians; but that their published observations upon it amount to a considerable body of medical literature.† This being the case, it is certainly a very curious fact, whatever the explanation, that the profession in England are almost entirely silent on the subject.

Among systematic writers, Dr. Craigie, in his *Practice of Physic*, Mr. Druitt, in his *Vade Mecum*, and Dr. Copland, in his *Medical Dictionary*, are, as far as I have been able to ascertain, the only English authors who have treated of the disease at all. All three speak of it as being all but unknown in England; and all three professedly derive their account of it from the French.‡ In the long list of writers on malignant pustule which

\* See for evidence of this Bourgeois's able paper in the *Archives Générales de la Médecine* before referred to. The testimony of all the best observers is unanimous as to this point.

† Heusinger quotes more than four hundred authors who have treated, either of malignant pustule or of the corresponding diseases in cattle, or of both.

‡ I do not mention Chelius's *System of Surgery*, because that may be said to be only a German book in an English dress. It contains, however, a brief but clear account of malignant pustule, with some notes added by the translator.

are appended by two of these authors to their respective articles on it, no English name appears.

With the exception of two cases of which Mr. Lawrence gave an account in a clinical lecture published some twenty years ago; and of a valuable series since related by Mr. Harvey Ludlow, there is, I believe, no description of the disease, drawn from actual observation, by any British practitioner.\*

From this one of two things is clear; either that a

\* Mr. Ludlow's paper, which appeared, in September 1852, in the *Medical Times and Gazette*, under the title of Carbuncular Inflammation of the Lips and other parts of the Face, and of whose existence I was not aware at the date of the present communication, does not appear to me to have received the attention it deserves. The paper opens with the following passage:—

"The disease which forms the subject of consideration in the following pages belongs to a class whose diffusion has been pretty steadily increasing in this country during the last five years. Before that period, it appears to have occurred quite sporadically, and to have been amenable to ordinary treatment. Hence, our medical literature offers but few original observations on the subject, the knowledge we possess of it being derived chiefly from continental authorities. Charbon and malignant pustule, indeed—diseases with which French surgeons are so familiar—present broad features of similarity to the affection which the accompanying cases are designed to illustrate; and although some trifling differences exist between them, yet the resemblance of their distinctive characters is evidently so close as to compel us to include them in the same class, and to place them in the same pathological light."

Although Mr. Ludlow hesitates actually to identify the disease he describes with the true malignant pustule, it is plain, from this passage, that he had a strong conviction of the close analogy between them. In the concluding part of his paper, he sums up his views as to the causes of the malady in the following words:—

"From a consideration of all the cases which are recorded in the journals, or have occurred during the last two years at the hospital (St. Bartholomew's), I think the disease may be attributed to three main causes. 1. The direct inoculation of a poison, animal or vegetable. 2. The inspiration of air tainted with such poisons. And 3. Feeding on unhealthy food."

The cases reported by Mr. Ludlow, to the number of six, are all characteristic examples of malignant pustule.

malady which is unlike any other, and which, in all respects, is one of the most remarkable to which man is liable, has hitherto escaped general recognition here; or that, as Mr. Druitt and Dr. Copland suppose, malignant pustule (except, perhaps, as a thing of extremest rarity) is never met with in England. This last alternative, if true, would be very difficult to explain, inasmuch as the epizootic from which malignant pustule is derived, so far from being unknown here, has, from a very remote period, caused every year a large mortality in English live stock.\*

The "joint murrain," "black quarter," or "quarter evil," and the "blood" (the name by which the malady is known in the sheep), are the same diseases as the "charbon," "quartier," and "sang" of the French, and the "milzbrand" of the German writers.

That a disease which is known to be communicable to man should prevail in this country, and yet never be communicated to him, would be a strange, if not an unaccountable thing.

\* The epizootic described by Matthew Paris as having been so fatal to cattle in England in 1252, was, probably, an epizootic of the disease in question. He relates that dogs and ravens which fed on the carcases of the infected cattle rapidly died in consequence, and the panic among men was so great that for the time the use of beef was given up. The following is the *verbatim* account:—

"Ejusdemque anni curriculo, post multa æstatis caumata, tempore adveniente autumnali, facta est tanta pestifera armentorum mortalitatis pluribus locis in Angliâ, precipuè autem in Northfolc et in Mariscoe, et partibus Australibus, quantam nullus se meminit previdisse. In quâ peste hoc evenit mirabile, quod de pecorum mortuorum cadaveribus, etiam canes et corvi qui vescebantur, illic intumuerunt et infecti obierunt. Unde nullus erat hominum qui carnes hovum comedere auderet, ne fortè ipse esset de morticinis memoratis." (*Historia Major* Matthæi Paris. Editore, Willielmo Watts, S.T.D. Londini: 1648. P 847.)

The fact, I believe, is not so. If my own experience may be trusted, the only reason why malignant pustule has been so rarely noticed by English writers is that, except by one or two observers, it has hitherto been confounded with other maladies which offer some points of analogy with it.

In the month of October 1856, I saw a case which presented all its characteristics in the highest degree, and which ended fatally on the seventh day. Since then I have been informed of twenty-three other instances of it. Of these twenty-three, two were seen by myself, and six others by intimate friends who have kindly favoured me with their notes.

That so many cases should have come, within so short a period, to the knowledge of a single practitioner, shows, at any rate, that it is high time we should all take serious note of the presence of this disease among us, and prepare ourselves to deal with its terrible emergencies.

As the malady is generally readily curable by decisive measures in its early stage, but is almost as generally incurable if this stage be allowed to pass without them—as the alternatives of death or recovery, therefore, depend on its early recognition—I have thought it a duty to bring the particulars of these cases (so far as I possess them) before the profession, in order that the attention of medical men may be directed to the subject.\*

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\* In the Twenty-first Annual Report of the Registrar-General, in a table of the causes of death registered in England in each of the nine years from 1850 to 1858 inclusive, the following are the numbers set down to carbuncle: 134, 161, 233, 252, 300, 255, 253, 252, 246. As there is good reason for believing that these numbers may be taken to represent, approximatively at least, the proportion of cases of malignant pustule in each year, they would seem to indicate that the

CASE I. On Oct. 21st, 1856, I was summoned by Dr. Robertson, of Terrell Street, in this city, to see a patient whom he had visited for the first time the day before, and whose case had put on a strange and formidable aspect.

The subject was a married man, rather more than thirty years old, who had for some years been employed as compositor in the office of the *Bristol Times*, and who, at the time of his seizure, was in good health. The disease under which he was now labouring had begun six days before, in the form of a pimple surmounted by a small vesicle, and seated on the upper lip. His attention was first called to this pimple by the severe itching it occasioned, and which annoyed him very much by interfering with his work. In his attempts to relieve this sensation by scratching the part, the vesicle was soon broken; a circumstance which led the patient himself to

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disease is on the increase. It is obvious, however, that these statistics cover too small a period to allow of any general inference being founded upon them. Much greater fluctuations are observed in other zymotic diseases in virtue of the common variations to which the whole group are subject. Unfortunately, no data exist from which the most distant approximation can be made as to the concurrent prevalence of the epizootic from which the malignant pustule is derived. The scientific study of veterinary medicine is too recent in this country to render the necessary records possible. We have already seen that there are good grounds for believing that joint murrain has prevailed in England from a very remote age. If there be some doubt whether in England generally malignant pustule has increased of late years, there seems to be none that in London it has greatly done so. In the Registrar-General's Report of the Health of London in 1858, the following passage occurs:—"The deaths from carbuncle were 61; fewer than in 1856, but ten times as many as the deaths from the disease in the earlier years. This troublesome plague of boils has been prevalent for some time." I shall hereafter give some reasons which render it probable that the flesh of diseased beasts is sent to great towns more largely now than formerly. (See the Report referred to, pages xl and 206.)



form a very definite theory of his case. The printing office had lately been supplied with a fount of new type, and the notion was that the hand, soiled with the new metal, had, in its frequent contact with the broken surface, poisoned the lip.

The same notion, under some other form, occurred in most of the other cases. The fact is worth noting, as showing that the nature and succession of the morbid changes involuntarily suggest the idea of a poisonous inoculation, even to non-professional persons.

In the course of the day, the swelling and hardness gradually extended; and on the day following, they were so considerable as to cause much disfigurement. It is important to remark, however, that apart from the local discomfort, the patient did not at that time feel ill, but continued to work as before. The malady was still in what the continental writers call the local stage.

On the third day, it had begun to spread widely over the face, and the patient was unable to leave the house. From this stage, it passed rapidly to that in which I first saw it, three days afterwards. The aspect of the disease was then very striking, and was unlike anything I had ever seen before. The lips were, at least, four times their natural thickness; of a deep violet, approaching to black; and as hard as brawn. This state of things extended to the whole circumference of the mouth, from the nose to the chin. The closure of the mouth being imperfect, saliva was constantly drivelling from it. On the space between the upper lip and the nose there were three or four small vesicles, containing a little reddish yellow serum. The temperature of the part was considerably below the normal standard. The rest of the face, the forehead, and throat, were also

much swelled, and presented very exactly the appearance which these parts have in bad cases of erysipelas. Passing from the mouth to the cheeks, the deep violet of the former gradually shaded away into a dusky red, and the scirrhus hardness gave place to a puffy swelling. The nose participated but little in the morbid change. The enormous prominence of the mouth, its hard and rigid state, and its almost black colour, caused a peculiar and hideous disfigurement, which was in the highest degree characteristic. The general symptoms bespoke rapidly failing powers. The pulse was more than 140 in the minute, and so feeble that it could scarcely be counted. The breathing was rapid; the belly tympanitic; and the body was bathed in a colliquative sweat. The breath exhaled a peculiar and disgusting fœtor, which, to my own sense of smell at least, was entirely new. The mind remained perfectly clear. A deep incision was made through the upper lip and carried into the cheek. The incised tissues were so hard that they creaked under the knife. But little blood flowed from the wound, the local circulation having, apparently, very nearly ceased. There was no trace of pus, but a serous exudation oozed freely from the part. Stimulants were ordered in liberal doses.

On leaving the patient at eleven o'clock at night, I appointed to see him again early in the morning; but he died in the course of the night. Decomposition set in very early, and advanced with unusual rapidity in the dead body.\*

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\* Virchow and many other writers lay great stress on this as one of the characters of malignant pustules. In the animal this tendency to putrescence is manifested even before death by the extrication of stinking gases in the affected part. Virchow also states

The rapid way in which life was destroyed by a disease that in its origin appeared so trivial; the peculiar manner in which the deadly influence of the disease was extended from the minute point in which it first appeared; and, lastly, the hideous and very uncommon aspect of the local morbid change, made a deep impression on all who saw the patient. In my own mind, it excited much speculation as to what might be the possible cause of so horrible a death. It was not, however, until I saw a second case, that I identified the malady as the malignant pustule of the French pathologists.

CASE II. On the 18th March, 1859, Mr. Exley, the principal of one of the leading schools of this town, called on me to ask me to visit one of his pupils, in consultation with the late Mr. Wilson of Clifton. From the description which Mr. Exley gave me, I at once recognised the disease as the same which had proved fatal to the compositor whose case has just been related.

The subject was a fine young man seventeen years old. Five days before the date of my visit, his attention was first drawn to a small pimple on his upper lip by the uncontrollable itching it occasioned. On examining the spot narrowly the same evening, he observed that the centre of the pimple was occupied by a small vesicle. This vesicle he punctured with a penknife, and a little serum issued from it. On the following morning, the lip, in a circumscribed spot, was swelled and discoloured. There was, at that time, no general disorder

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that, as the disease advances, colourless corpuscles abound in the blood; and he makes the still more remarkable assertion, that numerous vibriones may be seen in that fluid immediately on its withdrawal from the vein of the infected man or animal.

of any kind. He dined at the usual hour with the rest of the school, ate heartily, and was in good spirits. In the course of the next day, three or four small vesicles made their appearance in the space between the nose and upper lip. As the swelling had increased, and the part looked inflamed, it was thought prudent that the patient should keep his bed. It was not, however, until the day following that it was considered necessary to send for Mr. Wilson. The whole mouth now was much swelled and of a purple colour, and the lips were hard and tense. From that time the march of the disease was very rapid.

When I saw the patient two days afterwards, it was in appearance, and in almost every other respect, precisely what I had witnessed in the former case. I have never seen two cases of any other disease so absolutely alike. There was the same erysipelatous swelling of the forehead and face; the same enormous thickening, and black and hardened condition of the lips and mouth; giving rise, by the inordinate prominence of this feature—as if by some monstrous exaggeration of the negro type—to the same hideous and characteristic disfigurement. On the space between the upper lip and nose, there was the same crop of three or four small flat vesicles containing a straw-coloured lymph. Saliva was constantly drivelling from the mouth, and the breath had the same peculiar fœtor. The only difference I could detect was, that in this young man, the mouth and lips were, as yet, hot, and that extending from the ramus of the jaw, down the neck on either side, were several dark red streaks, marking the course of inflamed lymphatics; a circumstance which might have existed, but was not noted in the former case.

The pulse was 120 in the minute; the inspirations were forty-four. Rapid breathing was in both cases a leading feature of the disturbance. The belly was tympanitic. The patient had ceased to take much note of things about him; but when he was aroused, the mind seemed to be tolerably clear.

On making a deep incision into the upper lip, no pus issued; but there was a considerable flow of blood, of which as much as eight ounces were lost. The immediate result was a marked diminution of the local tumescence, and a palpable weakening of the pulse. This was at two o'clock in the afternoon. When the patient was seen again, four hours later, he was much worse. The mouth and lips were now cold; the pulse was 140; the inspirations were 64. When questioned, his answers were rational; but when he was left alone the mind wandered. The body was bathed in sweat.

From this time, he sank rapidly, and he died soon after daybreak the next morning, about sixteen hours after I first saw him. Thirty-six hours afterwards, the decomposition of the dead body was already far advanced.

At the time of his death, this young gentleman bore on his left leg the remains of a large boil, which had appeared about a fortnight before. This boil had followed exactly the common course of such things, and had led to none of the peculiar and deadly changes in surrounding textures and in the system at large, which followed the pustule, or, to speak more correctly, the vesicle on the lip.\*

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\* Bourgeois has very justly remarked that "the malignant vesicle" would be the fitter name for the disease, since one of its most special characteristics is, in all cases, the absence of true pus—at any rate, in the first stage.

CASE III. On Sept. 11th, 1861, I was asked to meet Mr. H. Grace of Kingswood in consultation on a case which proved to be one of malignant pustule. The subject of it, a clerk in a provision warehouse in Bristol, was a powerful, robust man, about 30 years old, who had always enjoyed good health.

Six days before the date of my visit, while he was in the act of combing his moustache, the comb stuck in a tender part. On withdrawing it, he found that the teeth of the comb had punctured a small vesicle, giving issue to a little yellowish-looking fluid. This accident was the first intimation he had of the existence of the disease which was so soon to prove fatal to him. The vesicle was situated on the upper border of the moustache, immediately below the left nostril. A slight depression and a small dried pellicle still marked its former place when I first saw the patient.

Immediately after the puncture, the part became the seat of a hot, stinging sensation, which lasted all day, and annoyed him very much, and which he described as being very peculiar. There was no itching strictly so-called.

In the course of the day, the lip began to swell, and towards night became very painful. In the night, the pain was so severe that he could not sleep, and he got up more than once to bathe the lip in the hope of relief.

The next day, the swelling had somewhat increased, and the part had begun to look angry. The uneasiness was so great that he found some difficulty in getting through with his work. On both days, however, he walked to and fro to the warehouse (a distance of rather more than two miles each way) and took his usual food.

On September 7th, the pain had much abated; but

the swelling and discoloration had increased; the disfigurement was considerable; and, for the first time, he did not leave the house. Apart from the state of the lip, he did not, however, feel very ill; and, up to that time, neither he nor his friends had the slightest idea that the malady was at all serious.

In the night of the 7th, that is to say, on the third day from the discovery of the vesicle, he was seized with severe stitch in the right side, and great difficulty of breathing. On the following morning, Mr. Grace saw him for the first time.

The whole of the upper lip was then much swelled hard, and discoloured; the appearances being such as to lead Mr. Grace to suppose that the case was one of carbuncle. The pulse was somewhat frequent and the breathing difficult. The pain in the right side was very acute, and the physical signs of pleurisy were present.

In the course of the day, a new crop of vesicles, to the number of five or six, made their appearance, chiefly on the right half of the lip.

From this time the disease did not make much progress locally, until September 10th, when the swelling rapidly extended to the whole of the face.

When I saw the patient on the day following, the state of things was in the highest degree characteristic. The lips were more than three times their natural thickness, as hard as brawn, cold, and of a deep livid red, verging in parts into purple and black. The mouth projected at least two inches beyond the rest of the face, giving rise to the same hideous and characteristic disfigurement noticed in the two former cases. The lips, from swelling and loss of muscular power, were imperfectly closed, and a viscid saliva constantly drivelled from between

them. The rest of the face had exactly the aspect which it presents in severe forms of erysipelas; the hardness, so extreme in the mouth, shading away gradually into swelling of a softer character. The eyelids were bloated and puffy, and the eyes permanently closed. Above the eyebrows there was no diffuse swelling, but four or five broad, dark red streaks, marking the course of inflamed lymphatics, traversed the forehead from the face upwards, and were lost in the hair. Scattered over the upper lip—chiefly in the space between the lip and the nose—were several small, thin scales, occupying the former seat of so many vesicles. The case was, in all its details, precisely what I had witnessed in the two other cases in which I had been before consulted. The pulse ranged from 132 to 140; the inspirations numbered 44 in the minute. The body was covered with a profuse, clammy sweat, and the vital powers were sinking from hour to hour. The breath had a very peculiar and repulsive odour, which I recognised at once as identical with what I had smelt in the two former cases. The pain in the right side had nearly ceased, but there was severe stitch in the left, and the patient complained of great difficulty of breathing. He was not in a state to admit of a complete examination; but I ascertained that air penetrated the lower half of the right lung very imperfectly. An obscure rubbing sound was audible over a small space on the left side, below the precordial region. As in the two former cases, I had no opportunity of examining the urine. The mind was quite clear; and the patient took freely and willingly strong beef-tea, brandy, and eggs, and other stimulants.

A stick of potassa fusa was held firmly on the upper lip at four different points where vesicles had existed,



until the tissues were destroyed to a considerable depth. A long, deep furrow was produced on the lower lip by the same means. There was a slight oozing of serum from all these parts, but no single drop of blood appeared. The circulation in them had apparently entirely ceased.

The patient continued to sink rapidly and died on the 12th of September; twenty-six hours after my visit, and eight days from the first discovery of the vesicle.

The inflamed lymphatics, the double pleurisy, and the rapid and terrible death, all occurring as the consequence of an affection which, a few days before, was nothing more than a vesicle so minute and insignificant as even to be discovered by accident, are circumstances which sufficiently mark the nature of the disease, and are of deep import in relation to its pathology. If I do not misinterpret the phenomena, they testify at once to an inoculation by a malignant poison, and to the intensely virulent nature of the morbid agent.

A circumstance deserves to be mentioned in connection with this case as bearing on its possible origin. About a week after the death of this young man, I was informed by his friends that he himself had a settled conviction that the pustule was caused by the use of a new pomatum which he had bought about a week before his illness, and had rubbed very freely into his moustache. As tallow-chandlers and soap-boilers have long been known to be frequent sufferers from malignant pustule in the countries where the corresponding epizootic is rife, it is quite possible that this view might be the true one.\* As

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\* Es ist eine alte Beobachtung (writes Heusinger) dass Seifensieder und Lichterzicher oft am Milzbrand-Karbunkel erkranken, wenn sie Talg von am Milzbrand krepirten Thieren erhalten. So

the patient was employed in a provision warehouse, it is equally possible, however, that he may have become infected in the exercise of his calling.

For the particulars of the next case, I am indebted to my friend, Mr. Green, senior surgeon to the Bristol Royal Infirmary. The facts are related in his own words.

CASE IV. On May 4th, 1854, I was sent for to see Master E., who was said to be suffering from swelled face. He was a tall, delicate youth, 17 years old, and had been for some months out of health, having come to Bristol for change of air.

I found the entire right side of the face much swollen. The lips, in particular, were very large and projecting and of a purple hue. On the margin of the upper lip, there was a small pimple covered with a scab. The parts were very hard, especially immediately around the pimple. The right eye was closed by the swelling. The pulse was quick, and the surface hot; the tongue brown and moist.

The disease had begun three days before with a small vesicle on the upper lip, which the patient had broken by scratching. The day before I saw him, the swelling,

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erzählt denn auch Hildebrand einen merkwürdigen Fall; zwei Schäferweiber erkrankten dadurch, dass ihnen beim Ausbraten des Talgs von an der Blutseuche krepirten Schafen dieses Fett in das Gesicht spritzte. Aehnliches berichtet Wagner. Als man den gewonnenen Talg (von einer milzbrandkranken Kuh) ausgebraten hatte, wurden die Griefen dazu benutzt zwei Schweine, zwei Hunde, und eine Katze damit zu laben, drei Thiere starben bald nacher, und zwar die Katze unter herum Wälzen auf kühlem Rasen. (P. 400, u. s.) If these statements can be relied on, the temperature to which tallow is raised in being melted would appear to have no power to destroy the virus. I have ascertained that in making certain varieties of pomatum, and particularly those in which trotter oil is used, the ingredients are mixed at a comparatively low heat.

which was before confined to the lip, had extended to the face; and as it went on increasing, the friends decided on having medical aid. From the aspect of the face, as well as of the patient himself, I looked upon the case as something different from ordinary inflammation.

On the day following, the disease had made great progress. The swelling had extended, and the affected parts, especially in the neighbourhood of the original pimple, were very dark in colour, and much indurated. The prostration was great.

At this visit, the real nature of the disease first occurred to my mind. I remembered once having seen a similar case in the wards of La Charité in Paris, which was made the subject of some clinical remarks by Roux, and I at once recognised the malady as the "pustulo maligne" of Delpech and the French writers.

I told the friends the serious nature of the case, and recommended a consultation, which they wished deferred until the morrow, when the patient's father was expected. As the danger to life did not then appear to be great, I consented to this arrangement.

I made a deep incision through the indurated part, which was evidently losing its vitality, as very little blood flowed in consequence. Tincture of muriate of iron was applied to the wound. I saw the patient late at night, and found his condition but little altered.

About 4 A.M., he became very much worse, and at 8 A.M., I was sent for to see him. The entire face was then of a livid colour, approaching to black; the pulso was hardly perceptible; the body was bathed in sweat. It was evident to all that he was fast sinking; and he

died at about 11 o'clock, five days after the first appearance of the vesicle.

The general treatment consisted chiefly in the liberal administration of good beef-tea, brandy, and ammonia.

CASE V. The notes of this case were kindly given to me by my friend Mr. Humpage of Cotham, who attended the patient.

"Mrs. S., aged about 40, married, the mother of three children, and of what is called the leucophlegmatic temperament, had complained for several days of a pimple on the chin, which, becoming troublesome, was seen by a surgeon three days before I was first called to her.

"I first saw her on Oct. 12th, 1855, in the evening, and found the following state of things:—On the *chin* a puffy tumour, with a livid spot on its apex; great surrounding swelling and infiltration of the cellular tissue of a hard and unyielding character, difficult deglutition, and much constitutional disturbance, indicated by a very low and rapid pulse, and general exhaustion.

"On the following morning, finding all the symptoms much aggravated, I advised a consultation with my friend Mr. Green. We agreed the case was one of the most imminent danger. A free incision was made through the parts; but they cut like brawn, *dry and solid*. The patient was directed to take brandy freely; but she rapidly sank, as if poisoned, about twelve hours after the incision, and in about thirty hours from the time of my first seeing her."

I have been informed by the husband of this person that for the first three days there was no general illness; nothing, in fact, to lead him to suppose that the malady from which his wife was suffering was any other than a common boil. It began as a minute vesicle,

which the patient punctured with a needle on the day following that of its first appearance, and it was her own impression that in this operation she had poisoned the flesh. The vesicle was attended by intense itching when it first appeared.

In some notes of the same case communicated to me by Mr. Green, it is mentioned that when the incision was made, nothing but a little serum slightly tinged with blood oozed from the wound.

CASE VI. For the knowledge of this case I am also indebted to Mr. Green, in whose words, for the most part, it is related.

On June 18th, 1858, late in the evening, I was sent for to see Miss S., living about seven miles from Bristol. Her father, who drove in for me, told me that a few days before a pimple appeared on the lip, followed by enormous swelling, discoloration, and stony hardness. She was, he said, frightfully disfigured. His account left me little doubt as to the nature of the disease I was to find; and I told him that I feared his daughter was suffering from malignant pustule, an uncommon and most dangerous form of disease.

I found the left half of the face principally affected. It was swollen through its entire extent; the lips were greatly enlarged, indurated, and everted. The skin was of a dark, livid colour. There was a small pimple covered by a thin, hard, dry crust on the left side of the upper lip, which was indurated to the extent of about an inch above its margin. The lower lip on the same side was in a state of slough. Sloughing had also begun at the angle, and was extending backwards into the mouth, under the skin, which had not yet lost its vitality. The eyelids were closed; but the swelling

there being œdematous, allowed the eye to be examined. This organ was found to be uninjured. The pulse was 120 in the minute; the tongue was foul. There was, however, no delirium or loss of consciousness, and no particular complaint of weakness or depression. The swelling and colour of the face, and the large projecting lips, caused great disfigurement, and removed all doubt from my mind as to this poor young lady's fate.

The disease had first appeared three days before, in the form of a small vesicle, which itched very much, and which the patient herself punctured with a needle the same night. This operation, as in most of the other cases, was followed by great temporary relief to the pruritus.

This young lady had spent the greater part of the day in the hay-field, and while there was, as she believed, bitten by a fly. It was in the seat of the bite that the vesicle afterwards appeared. The next day, the face began to swell and change colour; and from that time the disease progressed rapidly, until it had attained the stage in which I now saw it. The right side of the face did not participate in the swelling, but was of a sallow and yellowish tinge. On the second day of illness, the part in which the pimple first appeared having become black, Dr. Vaughan of Keynsham, who was in attendance, made an incision into it. Poultices had been applied to the face, and quinine and iron given internally.

A strong solution of chloride of zinc was now applied to the sloughing surface, and, in place of the quinine, dilute nitromuriatic acid was given every three hours. Wine and strong beef-tea were freely exhibited.

On the following day, there was little change, except that the sloughing had considerably extended.

On June 20th, soon after daybreak, she became rapidly worse. The pulse could hardly be felt; the extremities were cold; she was unable to swallow; and the entire cheek seemed about to sphacelate. She died at noon of the same day, five days after the first appearance of the vesicle, which, in its origin, had seemed so trivial.

This young lady had been somewhat out of health for some months prior to the fatal attack.

CASE VII. For the particulars of the next case, I am indebted to Mr. Bartrum of Bath, and Mr. Hinton of Hinton, who was nearly related to the patient.

The subject of it, W. H. W., was a fine, well-grown, and athletic young man, 19 years of age, who, up to the date of his attack, had enjoyed uninterrupted health.

On October 7th, 1859, he returned from Clifton to his home near Bath, with a painful and swelled lip. The disease had begun the day before in the form of a small vesicle seated on the left half of the upper lip. Whether the itching and hot stinging sensation which usually mark the onset of the malady were present is not said.

On his reaching home, the appearance of the lip led his friends to suppose that a boil was about to form in it. He complained a little of pain in the back, and seemed slightly feverish; but, beyond this, did not feel ill.

On the 8th, the swelling had increased; but, with the exception of a general dingy appearance, there was no local discoloration. On the nights of the 8th and 9th, the tension and pain of the lip were so great as to prevent sleep.

On the evening of the 10th, he took a slight sedative, had a good night, and never after suffered from pain.

Up to this time, nothing had occurred to awaken the minds of the patient or his friends to the terrible nature of the attack, which they still supposed was nothing more than a painful boil.

On the 10th, the swelling extended to the neighbouring parts; the inner surface of the upper lip became livid, almost black, "but without any defined boundary, as though a large carbuncle was forming on the inner surface."

On the 11th, the parts were freely and very deeply incised (from within), with much relief to the symptoms. The cut surfaces presented streaks of dingy yellow, interspersed with dark, livid, bloody, sodden tissue. The blood was thick and treacly. There was no pus.

On the 12th, the swelling occupied the whole face below the eyebrows. The incisions were repeated in several parts that felt brawny, and appeared to give much relief. The pulse had gradually become more rapid, ranging from 140 to 160 in a minute.

The mind remained perfectly clear until about four hours before death, which occurred at midnight on the 14th, eight days after the first appearance of the vesicle. In the second period of the disease, several new vesicles made their appearance in the neighbourhood of the first. Beef-tea, wine, and other nutriment, were given liberally throughout. The patient was unable to assign any cause for his attack.

For the following brief, but clear and graphic, account of the next two cases, I am indebted to my friend Dr. S. H. Steel of Abergavenny. They are extremely interesting, as examples of the disease originating in the hand.

CASE VIII. "While paying my usual visit at an iron-



work, four miles from my house, I was requested to see Mary John, the daughter of an innkeeper, a tall, healthy, well-developed girl, aged 19. She stated that two days before, a red spot, attended by pain and itching, had appeared on the back of her right hand. The redness had extended, and was now very painful.

"I found on the back of her hand a rather irregular, livid spot, half an inch in diameter, surrounded by an erysipelatous blush; deep near the centre, and gradually shading off till it ceased half way up the forearm. The hand and arm were swollen, but not greatly so. The pulse was small and frequent; the tongue was slightly coated and moist; the bowels were confined. She complained of great depression. The treatment ordered was a large warm fomentation to the hand and arm, and an aperient, followed by a stimulating mixture.

"The next morning, I received a message that she was much worse. I saw her at 11 A.M. The livid spot had spread over the whole of the back of the hand (and wrist. The swelling of these parts had rather subsided; but the whole arm was œdematous, and the erythema extended to the axilla and side of the chest. The pulse was very frequent and feeble; the tongue was still moist. She was sensible, and answered readily in a feeble voice, but was evidently moribund from prostration. I made two or three free incisions into the livid and adjacent œdematous parts. No blood, but only a little colourless serum, exuded, and no pain was felt. The appearance of the part was very peculiar. The lividity was less deep than that of ordinary gangrene, and shaded off into a dusky erythema, the œdema being greater as it receded from the central disease. The patient died at 2 P.M.

"I was convinced, from the whole aspect of the case, that it was one of some form of animal poisoning, and I made careful inquiries, especially whether any glandered horse had lately been in the inn stable; but I was unable to discover any clue to the cause of the disease."

CASE IX. "On January 2nd, 1854, I was sent for to see Morgan Jones, a labourer, aged 34, living about four miles from Abergavenny. He told me that five days before a red, irritable spot had appeared on the back of his right hand, which was chapped in several places from cold. The redness and pain had gradually increased; but he had paid little attention to it till the day before, when he felt very weak, and was unable to go to work. I found the back of the hand livid, and the arm red and œdematous, presenting an appearance precisely similar to that observed in Mary John's case. An incision through the livid part let out only a little serum. The pulse was small and frequent; the tongue was brown and furred, and had been so for a day or two. The man was perfectly sensible. An energetic stimulant treatment was adopted, but the case was evidently hopeless. It terminated fatally the following day. There was no history of animal infection that I could trace. The patient had been employed in tending sheep; hurdling them, and supplying them with cut turnips; but I could not ascertain that the sheep were unhealthy.\*

"I was much perplexed by these two cases. I had no doubt of their animal origin; but they did not answer to

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\* It is worthy of remark that in both these cases the disease was seated on the *back* of the hand. This is the usual seat of malignant pustule in the hand. It is obvious that, from the greater thinness of the skin, this part is more exposed to an effective inoculation.

the description of glanders, to which I was at first inclined to refer them.

“Some time afterwards, I was asked by my father's farm-bailiff to look at two lambs which were diseased, and likely to die of some strange complaint. The hinder extremities of both were greatly swollen, and inside the thighs, where the wool is scanty, the skin exhibited the *same livid aspect that I had observed in my two patients, and upon cutting into it, the same discharge of serum only took place.*

“I had no doubt that I had before me an identical or very closely allied disease. I did not, however, recognise it as malignant pustule, till I heard you relate your cases of that malady. The pustule, which is described as the point of departure of the disease, either did not exist in my cases, or, more probably, was overlooked.”

This history, brief as it is, is a very pregnant one. It brings into striking relief a point on which I have not before touched, but which is very important; I refer to the perfect identity of the local morbid changes in the malignant pustule of man, and the corresponding disease of the animal. I need scarcely say to those who are acquainted with the subject, that these two lambs were suffering from the disease familiarly known to veterinarians under the name of “blood,” and identical in nature and origin with the “quarter evil” in cattle. Both lambs died in the course of the day in which Dr. Steel first saw them.

In addition to the cases already related, I have obtained, as I have before said, some particulars of no fewer than fifteen others, which have occurred, for the most part, within the last few years in various parts of the country. It may be mentioned, as a remarkable

fact, that in all fifteen—as in seven of the nine just detailed—the disease began in the face, and in the greater number, either in the lip, or in the immediate neighbourhood of the mouth.

In all, save one, in which life was apparently saved by early resort to cauterisation and free incisions, the malady ended fatally. In all, save this same one, its seemingly trivial nature in its early stage betrayed the patient into the fatal error of wasting in mere temporising the only period in which curative measures are of any certain avail.

Of the whole series there was only one in which the disease was actually traced to contact with a diseased animal. In its bearing on the question of cause, the history of that case is not unimportant.

A pointer belonging to a gentleman who was out partridge shooting, fastened upon the carcase of a sheep which lay dead in a field, and took possession of one of its legs. The morsel was so savoury that the dog would not give it up, and his owner was obliged to wrest it with his own hand from the animal's mouth. Immediately afterwards, this gentleman, unthinking of danger, mechanically put his hand to a part of his face where there was a scratch. On the following day, a malignant pustule made its appearance on the very spot to which the tainted hand had been carried. The disease of which the sheep had died was not ascertained. The dog received no harm.

The circumstances of three other cases are also worth mentioning. One of the subjects was a bullock-jobber, who at the time of his attack was carrying on large dealings in cattle; and another was a sheep-farmer living on the borders of Dartmoor, who owned and tended very

large flocks. Although in those two the actual source of the disease was not made out, nor indeed inquired into, there is no improbability in the supposition that the pustule might have arisen from contact with cattle or sheep affected with quarter evil or blood. It is not irrelevant to observe that both these cases occurred in hot summer weather. I may add that the subjects of both were more than fifty years old.

In a third case, the pustule was undoubtedly the result of the bite of a fly. The patient—as in the similar case already related—was a young lady who was attacked by the insect while she was walking in her garden on a hot summer's evening. The itching, heat, and burning of the first stage succeeded immediately to the bite, and in the course of a few hours the characteristic vesicle made its appearance in the exact seat of the puncture. The case was the most rapidly fatal that I have yet heard of.

As I have never had an opportunity of observing this malady on the continent, where its characters are well known and universally recognised, it may perhaps be expected that I should state the grounds on which I have been led to identify the foregoing cases with it.

To those who have once seen a case of this kind, and are also acquainted with the literature of malignant pustule, these grounds must be sufficiently obvious.

Foremost among them stands the seat of the malady in the subjects whose histories have here been given. It can scarcely fail to strike every one as, in all ways, a deeply significant fact that in the whole series the parts attacked were the only parts of the body which in this

country are habitually uncovered. Had the face been the only part to suffer, the case had been less striking. In that event, it might have been argued with some plausibility, however erroneously, that the course and chief characters of the disease had their root in some structural peculiarity. But the fact that in the only two in which the pustule did not appear in the face, it appeared in the hands, and in the hands, too, of working people, getting their living by manual labour, not only excludes this idea, but renders the meaning of the whole history difficult to misinterpret. We have already seen what stress the continental writers lay upon this characteristic as suggestive of inoculation from without. But whatever its import may be, as a part of the natural history of malignant pustule, it has not only obtained universal recognition, but has been put in the foremost rank by all the best observers.

*"Immer erscheint der (milzbrand) Karbunkel an unbedeckten Stellen."*—"Malignant pustule always appears on uncovered parts"—is the universal remark of the German writers.

"It is never seen but in the face, neck, and hands; in parts, finally, which are habitually uncovered, and which lie open to the impression of an external agent"—is the pointed expression of Enaux and Chaussier.

Speaking of the different points which malignant pustule may attack, Bourgeois says:—"These points are, in the immense majority of cases, seated on those parts which are habitually uncovered, and which, in consequence of this, may easily be put into relation with the numerous vehicles of this malignant virus."

In another passage he adds:—"The application of the carbon virus to the skin being indispensable to the

development of malignant pustule, it is readily conceived why the uncovered parts of the body should be its almost exclusive seat ; thus, the face, the neck, the hands, the arms, and the legs, are almost the only parts on which it appears. When by chance it developes itself on other parts, we may be sure that the poison has been carried there directly by the fingers or other agents impregnated with it."

In one form or another, these statements are echoed by every foreign writer of any emiuece who has treated of the malady. But if the foregoing cases agree with malignant pustule in a peculiarity so significant as that here defined, their agreement with it in all that regards the curso and character of the morbid changes is not less striking. The more, in fact, we enter into detail in pursuing our comparison between the two things, the more perfect their identity becomes. To one of two alternatives, indeed, this comparison necessarily drives us. Either the cases which have been described in this paper are identical with the specific disease which Chaussier, Bourgeois, and others, have described under the name of malignant pustule, or it is not possible to convey a knowledge of a disease, striking beyond most others, by description at all.

The phenomena which these cases exhibited, from their first minute beginning to their terrible and unexpected end, were, in every particular, identical with those which, in farriers and others who have the charge of cattle in continental countries, have been seen, in numberless instances, to proceed from the accidental but direct inoculation of the "charbon" virus.

The commencement of the disease in an affection resembling the bite of a gnat, and, at first sight, not at

all more serious, in outward seeming—the importunate itching or the equally characteristic stinging and burning of the early stage—the formation, within a few hours of the well known vesicle—the hardening, blackening, and death (the “mummification,” as the French and Germans express it) of the textures immediately around it—(hardening so extreme and death so entire that in more than one instance the knife of the surgeon creaked in the flesh, inflicted no pain, and gave issue to no blood)—the diffuse and erysipelatous swelling of the wider area—the crop of secondary vesicles—the chains of inflamed lymphatics—the peculiar fœtor of the breath—and, lastly, death amid all the indications of septic poisoning—were incidents common to them all. In the one or two cases, indeed, in which some of these circumstances fail, I have especial reasons for believing that their absence from the record is simply due to their not having been noted.

Taken in their whole succession, it may be safely affirmed that these are incidents which are diagnostic of malignant pustule, and belong to no other malady. Its characters in its advanced stage are, in fact, so marked and distinctive that to confound it with any other disease would seem to be well nigh as impossible as it would be to do the same with small pox or glanders.

Striking as are the positive signs, the negative signs are scarcely less so. Among these, especially noteworthy for a malady so rapid and severe, are the absence or slowness of pain, and still more so, the entire absence of common suppuration. In not one of the whole series of cases was there any visible trace of pus. These things are important, not only because they are well known characteristics of malignant pustule, but be-



cause they have no doubt a fundamental relation, as such, to the peculiar mode of action of the specific poison.

If any doubt still remained on the subject, it should be dispelled by the fact that my friend Mr. Green, the experienced senior surgeon of the Bristol Royal Infirmary, at once recognised the disease of which his three patients died, as the same with the malignant pustule which he had formerly seen in Paris.

By those who refuse to admit the force of these considerations, it is no doubt *possible* to take another view of such a history. It might, for instance, be argued that these cases have nothing specific in them at all; but are simply cases of pyæmia originating in some erysipelatous local change, however arising. And such an argument would not be altogether without support. Most practitioners must have seen at some time or other, examples of pyæmia, issuing in rapidly fatal general infection which originated in some trivial injury without the presence or intervention of any virulent agent. In such an event, personal predisposition, and what passes by the name of epidemic constitution (whatever that may mean) might one or both be supposed to play a part. The most common seat of the affection, and the comparative youth of the greater number of the subjects, might also be regarded as having each a hand in the result.

It is well known from what slight as well as various causes the lips swell to a degree that is observed in no other part, and how especially strong this tendency is in early life. In these two conditions, an explanation more or less plausible might be found of some of the peculiarities which most challenged attention in the cases before us. As a matter of fact, it is known to me that

the view here put forward in this hypothetical form is the view actually entertained of these cases by more than one eminent observer, who has had many similar ones to treat. After having myself given it the fullest consideration, I am not the less convinced that it is not the true one.

This much, at any rate, is certain; that the two facts on which those who take this view chiefly rely—the seat of the affection in the face and its preference for early manhood—so far from being in their favour, must be read the other way. For these very two are among the best known of the characteristics of malignant pustule itself.

*“La face est, on peut dire, le siège de la prédilection de la pustule maligne”*—“the face is the favourite seat of malignant pustule”—says Bourgeois; a remark which is strikingly illustrated by the records of the disease, and which, I may add, is especially true of those cases in which it occurs in persons who are not by their calling exposed to direct inoculation. In pushing the analysis further, it will be found that, in the great majority of these cases, the disease was seated in the lip or in the near neighbourhood of it.

Its greater frequency in early manhood (although, as the foregoing instances show, it is by no means confined to this period of life) has not only been often remarked, but various writers have taxed their ingenuity to account for the fact.\*

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\* Much more precise data than any now existing would be required to show what the fact really implies. Heusinger believes that it is simply a matter of more frequent exposure. In his chapter on the influence of age, the following passage occurs:—

“In Beziehung auf der Menschen meint Erdmanu, Kinder würden

To occur mostly in the face, and to attack chiefly persons who are comparatively young,\* are marks which, so far, therefore, from indicating, as some suppose, a non-specific origin, of themselves constitute a strong presumption in favour of the identity of the cases which present them with the malignant pustule. The course of the disease and the character of the morbid changes are all that remain to be taken into account, and we have already seen how perfectly and minutely identical in all the most striking of their very striking peculiarities were the foregoing cases with the disease which is derived from the "charbon" of cattle.†

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nicht befallen. Regnier sah den Milzbrand nicht in frühesten, und im böcßsten Alter. Glauström sagt, selten litten Kinder und Greise. Ich glaube das rührt nur daher, dass sich das mittlere Alter im Allgemeinen am häufigsten der Ansteckung aussetzt, und es scheint mir eben nicht daes das Alter einen Unterschied in der Anlage begründe, denn ohne viel zu suchen bieten sich gleich Beispiele von böchsten und jüngsten Alter dar."

That adults are much more exposed to the chances of inoculation than children is obvious enough. May not the greater frequency of the disease in adolescence than in elderly persons be due to the greater delicacy of the skin in young persons?

\* It is not a little remarkable that, except in times of great epidemics, the "charbon" scarcely ever attacks any but comparatively young cattle. "Le charbon," says Chabert, "n'attaque guère que les jeunes animaux." (P. 154.) The same observation has been made universally of the quarter evil here. Yearlings and two-year olds are, as a rule, the chief sufferers. In man and in beast alike, therefore, adolescence—if I may use such a word in common—would appear to be the period of greatest liability. The greater delicacy of the skin in young cattle may also possibly come into play here. But that would not explain why it is that young calves so generally escape. It is not impossible that, as in so many other contagious diseases, there is a certain period of life in which the specific liability is much greater than at others. As the disease is readily propagated by inoculation, it might be determined by experiment how far the greater liability of adolescent cattle depends on constitutional causes.

† In this discussion, I have altogether left out of account the perfect resemblance of the morbid changes in these patients to those which occur in the animal; a resemblance so strikingly brought out in my

Assuming the question of diagnosis to be settled, the next that arises is, in what way did the persons whose cases have been related become inoculated with the "charbon" virus?

Here, I regret to say, as regards the majority at least, facts altogether fail me. In the greater number, the specific nature of the disease was not recognised, and the possibility even of its having been derived from diseased cattle did not once enter the mind of the observer. With the exception of some five or six cases already specially referred to, nothing came to light to indicate in any way the origin of the disorder.

As in regard to this point I have nothing but conjecture to offer, I will be as brief as may be. In the absence of direct information, two principal modes occur to me, in which some of the subjects of the foregoing cases may have received this contagion. One is by eating the flesh of animals slaughtered while affected with quarter evil or blood; the other by being inoculated by insects which have previously been in contact with animals or the carcasses of animals affected with this disease. All that I know of the former mode of communication is that the material conditions for it are not wanting among us.

friend Dr. Steels's narrative. The early and entire death of the inoculated part, and the blackness, dryness, and insensibility of the immediately surrounding tissues in both, constitute a series of relations which is, in all ways, of very great interest. In any future cases, it might be well to put the identity of the two diseases to a still further test by inoculating some one or more of the animals subject to "charbon" with morbid products from the infected man. Virchow states that of these products the serum of the characteristic vesicles is the most virulent. In the French experiments, however, this serum always failed. On the whole, blood from the spleen appears to convey the poison the most surely. To ensure success, a young animal should be chosen, and more than one should be inoculated.

That the flesh of oxen and sheep so affected is not an uncommon article in English markets, I have been assured by persons who have been themselves parties to the traffic. The information I have received leaves no doubt, in fact, that nearly the whole of such flesh is disposed of as food. The testimony of the many graziers and butchers I have consulted is unanimous as to this point.

In cases in which the malady is far advanced, the diseased quarter is rejected, and the other three only are sent to market. But where it is in an earlier stage, the whole carcase is often sold.

In these last I am told that a peculiar method is adopted to obliterate the marks left by the morbid change. Wherever the meat looks black or discoloured, it is dipped into boiling water, and its surface is then rapidly seared with a red hot iron. The effect of this is to cause a superficial whiteness, which in a great degree masks the mass of putrescence beneath. My authority for this statement is a grazier, who assured me that he had himself often witnessed the process.

To such a height, indeed, has immorality of this kind risen that a class of butchers has sprung up whose chief trade lies in the purchase, and sale for food, of cattle and other live stock affected with this and other diseases. In this matter of unsound meat, the inhabitants of large towns are the chief sufferers. Although too many farmers have no scruple in selling to others the flesh of diseased cattle, instinct has given them a wholesome dread of its possible effect on their own persons. But the infected carcase which cannot be disposed of to neighbours is readily sold to the unsuspecting inhabitants of the great city which lies some miles away.

The development of railways has opened new facilities for this sort of traffic, not only by offering greater secrecy for it, but by vastly enlarging, through increased rapidity of transit, the area from which such unwholesome supplies are sent.

It is well worth considering whether the increase which has certainly taken place of late years in the number of cases of malignant pustule in London and other large cities may not be in great part due to this circumstance.\*

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\* These remarks were written more than three years ago. The following extract from Dr. Letheby's Quarterly Report on the health of the city of London, which appeared in the *Times* on the day following that on which this paper was read, will show how well founded they were. The confirmation of what I had suggested as to the effect of railways is especially striking:—

"The markets and slaughter-houses have been duly inspected, and the officers have seized 39,315 lbs. of meat and 765 head of game and poultry as unfit for human food. It consisted of 171 sheep, 14 calves, 43 pigs, 271 *quarters* of beef, and 235 joints of meat; 32,098 lbs. were diseased, 4147 lbs. were putrid, and the rest was from animals that had died from natural causes. In the course of the quarter, five persons have been convicted, at the sessions of the Central Criminal Court, for sending diseased and unwholesome meat into the city markets, and sentenced each to six months imprisonment. Their names are—Thomas Stevenson, of Millstone Lane, *Leicester*; John Jarvis, Towcester, Northamptonshire; Daniel Cotton, Belgrave Gate, *Leicester*; George Hill, Mansfield Street, *Leicester*; and George Warrens, Belgrave Street, *Leicester*. Four out of five of these persons were from *Leicester*, where it is to be feared the practice of sending diseased meat to the London markets is very common; and in every instance the persons were butchers, and therefore must have known the illegality of the practice."

The following extract from the next subsequent report from the same distinguished hand shows that the evil still continues. Speaking of the sanitary action of one week only, Dr. Letheby says:—

"The markets and slaughter-houses have been duly inspected, and the officers have seized 4525 lbs. of meat and 73 head of game and poultry as unfit for human food. It consisted of 16 sheep, 10 pigs, 32 *quarters* of beef, and about 50 joints of meat. *Three-fourths of it was from diseased animals*; and I recommend that in five cases the matter be submitted to the solicitor for further investigation.

That every year, in most large cities, a considerable number of persons may be found who have eaten the flesh of animals affected with quarter evil or blood may be considered as all but certain.

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The inspectors inform me that much of the diseased meat of Newgate Market finds its way to the *sausage makers* of Cow-cross. Last week the inspectors seized the carcasses of a diseased sheep and a pig which were being carried to a sausage maker in that locality. The sheep had died from rot; and the pig was covered with small abscesses like boils, many of which had burst through the skin and the rest were still full of matter. Both of these animals were in a shockingly diseased state, and but for the interference of the inspectors would have been converted into *sausages*. I have also to state that the slaughter-houses of Cow Cross, which are just outside the city, are a source of great anxiety to the inspectors, from the circumstance that diseased animals are frequently slaughtered there, and brought into the city markets. Last week there were two such instances. Two diseased bullocks had been killed in the slaughter-house of a Mr. Croese, and then carried to Newgate Market, where they were seized by the inspectors. In like manner, at Whitechapel, it is a common practice with some of the butchers who are outside the city boundaries to traffic in diseased meat; and the city butchers and salesmen complain that they have not the same chance for the disposal of inferior meat that their neighbours have, and that the rigorous supervision of the city is unjust to them. Only last week, the carcasses of several bullocks, about a dozen or so, that had died on shipboard, were sold in Whitechapel. Meat of this description is disposed of to the poor at night, when it passes for wholesome meat, and realises from a penny to five farthings a pound."

What is here stated in regard to *sausages* has a special importance, not only because of the obvious facilities which they offer for the disposal of unsound meat, but because, from the mode in which they are cooked, the temperature to which they are raised in being prepared for table, must often be insufficient to destroy the powers of zymotic poisons. Under these circumstances, any rudimentary entozoa that may happen to be present survive the operation; and for the same reason, I am led to believe that sausages are often the source of disease in men by the introduction of tapeworm and other parasites.

So much for the London commissariat. The following extract from the *Western Daily Press* of Oct. 3rd will show that the evil is by no means confined to the metropolis:—

"DISEASED MEAT IN BRISTOL. Yesterday at the Council House, before the sitting magistrates, Messrs. J. Poole and W. Naish, John

On the other hand, I have ascertained, by careful and repeated experiments, that the temperature to which meat is generally subjected in the operations of roasting and baking, in no wise, except perhaps at the exposed surfaces, impairs the powers of animal poisons.\*

Suppose now that a person eating such infected meat roasted or baked, has a chap or abrasion on the lip, and we have at once all the material conditions that would

Cann, jun., was summoned for having in his possession and offering for sale a quantity of unwholesome meat, unfit for human food. Mr. Heaven, clerk to the Local Board of Health, appeared in support of the information, and said it was brought under the 126th clause of the Nuisances Removal Act, which prescribed a fine not exceeding £10. He further said that in the present case it was not one bad piece that was complained of, and which might have been accidental, but several pieces, both of mutton and beef, and also of lamb; and he, therefore, should press for a severe penalty being inflicted. Mr. Yates, inspector of nuisances, said on September 20th he visited the defendant's board in the St. Nicholas Market, and there saw the whole of the fore half of a sheep in a dreadful state. It was in a basket, put a little aside, and the defendant told him it had just been left there by some one. He also saw some beef in a bad condition, covered over with a cloth. Afterward he saw a poor woman at the board, with a piece of this beef in her hand, about to purchase it. On further looking about, he found a loin and a leg of lamb, both bad. He seized the meat; and on taking it before the magistrates on the Monday morning, they ordered it to be destroyed. Defendant said he thought the meat as being good, and owing to his defective sight, he did not know but that it was so. Mr. Yates, however, said anyone could have known it was bad by feeling it. The magistrates said they thought the case was clearly proved; and they fined the defendant 20s. and costs, or, in default of payment, one month's imprisonment. They also wished it to go forth that all cases of that sort which came before them would be punished."

It seems probable, from the account, that some of the meat here referred to was taken from animals that had died of quarter evil. It is worthy of remark that the meat would probably have been undiscovered had it not been for the increased vigilance of the police in regard to these matters, excited by the panic as to small-pox in the Wiltshire flocks.

\* These experiments will form the subject of another communication.



seem to be required for an effective inoculation. Seeing how common such abrasions are, it is by no means improbable that now and then all these conditions may be found together. On the whole, however, I incline to the supposition that in the case of persons whose calling does not bring them into direct contact with the virus, the inoculation is generally effected by flies.

In two of the cases mentioned in this paper, there seemed to be direct evidence of the fact. In these two, the disease undoubtedly followed the bite of a fly and occurred in the seat of the puncture.

Great numbers of similar cases are on record,\* and the fact that these insects intervene largely in the propagation of the disease is now generally admitted.†

\* The following paragraph which occurred in the *Times* on Nov. 11th, 1858, evidently relates to a case of this kind :—

"EXTRAORDINARY DEATH. Madame Moet, the celebrated proprietor of the champagne vineyards, whose daughter was married the other day, has just met with her death in a most extraordinary manner. She was gathering flowers in her garden, when she felt herself bitten by a fly. She thought nothing of the slight puncture; but in the evening her face began to swell, and a few days afterwards she died in intense agony. It is supposed that the fly must have fed upon putrid flesh."

A few months later, an exactly similar account was given in the *Times* of the death of the wife of our ambassador at Brussels.

† I may cite, in confirmation of this, a paragraph which appeared in the Paris correspondence of the *Times* on Sept. 26th last :—

"Cases have lately been very frequently cited in the French papers of persons becoming extremely ill, and even dying, in consequence of the stings of venomous flies, the said venomous quality being contracted by the insect from putrid substances on which it has settled. Near Soissons, a shepherd lately died in four days in consequence of one of these bites or stings. He took no heed of the first inflammatory symptoms, and when he applied to the doctor it was too late. Two other persons in the same neighbourhood were similarly attacked, the symptoms being great swelling and inflammation; but fatal results were not anticipated. Some of the French

Some writers are even of opinion that the human subject is inoculated by them in the great majority of cases; an opinion that would go far to explain the well known greater frequency of the disease in hot and dry summers, and in countries where insect life is active and teeming.

It would go far to explain, for instance, the much greater frequency of the malignant pustule in Burgundy than in England and the north of France, as, also, its greater frequency in Siberia and Lapland, where insects of the mosquito tribe are the great pest of the traveller.

In Lapland, indeed, before the identity of malignant pustule with the "charbon" of animals had been finally established, the popular belief was universal that the former was caused by a peculiar insect, which suddenly descended from the air and as suddenly disappeared.\*

Such consistency had this view acquired in the middle of the last century, that the illustrious Linnæus, on the strength of information received from Solander, even went so far as to admit this hypothetical creature into his systematic zoology under the significant name of "*furia infernalis*." (*Amenitates Academicæ*, vol. iii, p. 322.)

provincial newspaperers have published strong recommendations to all persons who may be stung by suspicious flies or insects, to resort at once to a medical man, who alone is able to judge how far the apparently trifling injury may be serious."

\* The following paragraph, which was published in the *Times* in the autumn of 1860, shows that this is still the popular belief in the north of Europe:—

"VENOMOUS FLIES. More than four hundred persons have lost their lives in the south of Russia, and in the province of Kiew, from the sting of a venomous fly, which has come from Asia. It made its appearance in the same country about sixty or seventy years ago."

Virchow, who has made malignant pustule the subject of special investigation, and who fully admits the agency of flies in its propagation, makes the following remark:—"Most commonly insects with piercing probosces effect the inoculation, such as gadflies (*bremse*); *but flies which make no wound, may, also, implant the poison on the skin by their soiled wings and feet.*" (*Handbuch der Speciellen Pathologie und Therapie*. Article, Milzbrand—Karhunkel.)

Bourgeois expresses himself to the same effect:—"The different parts of animals (he says) are not the only vehicles of the virulent principle. Certain insects, after having sucked the putrid juices of dead or sick animals, and then settled on the persons of men, may communicate the infection. I have frequently met with cases of 'charbon' in persons *living near tanners and fellmongers*. I have also seen, in one case, the disease caused by the puncture of a gadfly which came out of a fleece of wool."\*

As the bite of those flies to which malignant pustule may be often traced is generally perfectly harmless; as these flies are endowed with no venomous powers of their own, and, finally, as the pustule to which they now and then give rise is perfectly identical with that which springs from direct inoculation, the inference seems very sure that the only part they play in the propagation of

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\* In the same passage, he adduces some other modes of infection which deserve mention. After relating the fact given in the text, he adds:—

"In another case, I saw it communicated by a splinter detached from a piece of wood taken from a shippen. In some cases, it is enough to touch the garments of persons belonging to the callings previously referred to (tanners, shepherds, farriers, etc.), or to hold relations with them, although they themselves may remain unharmed."

the disease is in conveying the specific virus from the infected animal to man.

That they should be frequent carriers of this virus would seem to follow necessarily from their gastronomic habits. Wherever there is a bullock or sheep, dying or dead of this contagion, especially in summer or autumn, flies of several kinds may be seen in swarms attacking the diseased part, and feasting on the stinking profluvia which often issue from the anus, mouth, and nostrils, of the diseased animal.\*

When the animal is flayed, they show the same fondness for the carcase, also, and (in virtue of the instinct which gives them a peculiar relish for stinking things) especially, it would appear, for that part of it which is most affected.

The only link needed to complete this chain of relations is found in the fact, of which Heusinger quotes many examples, that hutchers, farriers, and others, have

\* In regard to this point, Hintermayer, in a very interesting account of a remarkable epidemic of quarter evil, which raged in the summer and autumn of 1846, among the deer of the park of Duttstein, makes, from his own observation, the following important statement:—

"Alle wesentlich habe ich hier noch zu bemerken, dass die Bremsen, und zwar (a) die grosse Rind-hremse (*Tabanus bovinus*), (b) die Regen-hremse (*Tabanus pluvialis*), und (c) die Blind-fliege (*Tabanus coecutiens*), welche im verflossenen Sommer in unzähliger Menge vorhanden waren, wohl mit Recht alle die theilweisen Träger des Contagiums anzuehen eind, und daher eine grössere Ausdehnung der Seuche verursachten. Diese setzten sich gewöhnlich zu Tausenden, auf die Cadaver der gefallenen Thiere, saugten die aus Maul, Nase, und After kommenden Profluvien ein, verliesen sodann die Leichen, hegaben sich sofort auf gesunde Stücke, atachen ihren von Contagium Saugrüssel in die Oberfläche der Haut ein, und inoculirten auf solche Weise das Seuchengift." (Kreutzer, *Central Archiv*, b. iii, p. 437.)

It will be seen that Hintermayer ascribes to flies the chief part in the propagation of the disease among animals also.

been bitten by flies which a moment before were seen to be so occupied, and have had malignant pustule in consequence.

I once thought that the usual situation of the pustule was almost decisive in favour of its being communicated by direct contact with tainted meat. It is certainly a very remarkable fact that in twenty of the twenty-four cases referred to in this paper, the disease began in the lip, or in the near neighbourhood of the lip : of the organ—that is to say, that seizes the food. But the fact tells, in reality, almost as much in favour of one mode as of the other. In the first place, the skin of that part being thin and delicate, is more easily pierced than the skin of other parts of the face.\* In the next place, it is, from various causes, much oftener denuded of its cuticle; and for this reason (as indeed from its greater natural tenuity, also) more open to the accidental absorption of foreign matters. And, lastly, particles of sugar and other things attractive to flies are apt to collect about the edge of the mouth, so as to make it a favourite spot for their attack.

If it be objected to these considerations that they are too speculative, I would reply that we may, at any rate, draw this practical inference from them : not to think

\* I have already referred to the part which delicacy of skin probably plays in predisposing to the disease. But, as in other contagious diseases, other and less appreciable conditions no doubt intervene. Vincenzo Malacarne, in speaking of the disease in men says :—

“Fra i quali passa gran differenza nella suscettibilità del morbo, vedendosi fra i compagni del lavoro nel macello de Buoi infetti, nella scorticatura, nelle medicature, per cui tutti sono di sangue, di sanie ugualmente aspersi, ed imbrattati, eppure certuni contraggono il carbonchio, ed altri ne vanno esenti.” (Vincenzo Malacarne, *Op. cit.*)

the more lightly of a suspicious looking boil because it was known to originate in the bite of a fly.\*

In considering the origin of any individual case, it is, I need scarcely add, important not to lose sight of the many other ways in which this poison may find access to our bodies. In our daily life, we come so incessantly into contact with animal products which are known vehicles of it, that it is not surprising that among the numerous persons who die of malignant pustule every year in England, the disease should often come in, like so many other contagions, through paths which it is impossible to trace.

This paper would be incomplete were it to conclude without a word on treatment. As, with one exception,

\* This is not the only human disease in whose propagation flies play an important part. The Egyptian ophthalmia and the frambæsia, or yaws (another malady indigenous to Africa), will occur to the reader as familiar illustrations. Alibert's observations on the frambæsia will bear quoting in connection with this point:—

“La contagion du Tian (Frambæsia, *Anglicé* Yaws) est à ce qu'on assure, singulièrement facilitée par une espèce de mouches que l'on nomme ‘Mouches Frambæsia,’ et qui sont très abondantes dans les pays chauds; les mouches se reposent à tous les instans sur les horribles pustules qui proviennent de la maladie, et elles vont inoculer le virus aux individus sains, qu'elles piquent jusqu' au sang. Est-ce aussi par cette voie qu'elle a pu se transmettre aux animaux domestiques, comme on pretend l'avoir observé? Lœffler assure qu'il y a des endroits en Amérique, où la loi defend aux malades attaqués du Pian de sortir, et qui leur interdit même tout accès dans les hôpitaux. On trouve en effet que cette précaution a considérablement diminué la propagation de la maladie.” (Alibert's *Maladies de la Peau*, p. 164.)

Curiously enough, in all these cases, the flies themselves do not seem to suffer at all from the poisons which exert such a virulent effect on the higher organisms. In helping to perpetuate these specific contagions, they perform a function which may be compared to that which Mr. Darwin, in that wonderful piece of natural history poetry, “The Fertilisation of Orchids,” assigns to other winged insects in the propagation of that peculiar tribe of plants.

all the cases of which I have any knowledge ended fatally, it will be readily understood that I have nothing of my own to offer in the way of cure. Unfortunately, there is too much reason to suppose that, in some of the number, the measures intended for relief were worse than futile, and only hastened death. This was certainly the case with the incisions made in two of the instances which fell under my own eye, and with the leeches that were applied in some others. This uniformly fatal issue is the more mortifying because, in its first period, the disease seems to be in a great degree under the control of remedies.

Rayer, who has had great experience of it, says, in reference to the disease during this period, "its progress may very certainly be arrested by the use of caustics." Nothing can be more positive or unqualified than this statement. The testimony of all the best continental observers is to the same effect.

In Bourgeois's valuable paper, and in Enaux and Chaussier's monograph, numerous cases are given in illustration, which seem to leave no doubt of the fact. Of the various caustics in use the evidence appears to preponderate in favour of the potassa fusa. It is right, however, to state that Chaussier, and one or two other writers of equal eminence, prefer nitric acid or the chloride of antimony. For information as to this and other practical points, I think it best, however, to refer to the original authorities.

From all this it is evident, as I remarked at the outset, that everything hangs on the recognition of the disease in its first stage. In that stage I have myself never seen it. As the subject is comparatively new to the profession in England, and as the point is one of such vital

importance, I shall not, perhaps, do amiss in inserting here one or two descriptions of the malady as it presents itself at its onset.

*Anthraxion with Diffuse Gangrene.* "This variety begins with a considerable degree of pruritus, which is succeeded by the appearance of a red spot like a flea-bite. The vesicle, of the size of a millet-seed at first, soon acquires larger dimensions, and if not ruptured by the patient bursts spontaneously. Twenty-four or thirty-six hours after the attack, a small, hard, and circumscribed nucleus, having the form and size of a lentil, is perceptible under and around the seat of the vesicle. In the circumference of this, a soft, but still resisting, swelling, of a reddish or livid colour, covered by and hye with secondary sero-sanguinolent vesicles, at first isolated, but speedily becoming confluent, is developed. The central point, now of a brownish hue, extremely hard and very insensible, becomes gangrenous. The inflammation extends to a considerable distance; the neighbouring skin is red and shining; the subcutaneous cellular tissue is puffy, tense, and, to appearance, emphysematous. The diseased part is benumbed, without proper sensation, and the gangrene advances with rapidity." (Rayer, *Treatise on Diseases of the Skin*, Second English Edition, p. 559.)

Virchow's account runs thus:—"In the first stage, on looking narrowly at the affected part, you generally discover a small red spot, sometimes with a blackish point in the middle. This spot becomes gradually more irritable, and itches greatly. The patient scratches it; it becomes more and more red, swells up, and forms a small papula; the parent nucleus (*den Mutter-knoten*)—the 'maltka' of the Russians. Most commonly, a



vesicle then makes its appearance, which soon attains the size of a millet seed, and contains, at first, a transparent bright yellow fluid, which, however, very early becomes reddish or bluish.

"This is the characteristic malignant pustule, which is usually single, rarely multiple, and which, in most cases, is too soon destroyed by scratching to admit of our carefully studying its development. Underneath the vesicle may be seen the bluish red surface of the nucleus, seated in the substance of the skin, and which continues to extend both in depth and circumference.

"The excoriated surface *readily dries up, and becomes, as it were, mummified*, showing that generally here already the circulation is much enfeebled; while in the neighbourhood, new vesicles spring up, which run the same course. Soon the part loses its vitality, so that it may be pierced with needles without the patient's becoming aware of it."\*

The seeming insignificance of the affection in its first origin; the urgent pruritus; the development of a

\* Virchow, *Op. cit.* The characteristics of the early stage come out in still stronger relief in the terse phraseology of the Latin tongue. The following description is taken from an account of malignant pustules by Hunnius:—

"Loco, ubi carbunculus se formaturus est, tumor parvus, aucto calore præditus, lotui culicis similis oritur, paulo post in se vesicula magnitudinis grani milii evolvitur, vel vesicula hoc statim ab initio sczsmati similis, tumors non prægresso, formatur. Eruptionem comitantur pruritus et fornicatio cutis, quibus ægrotus ad scabendum impellitur, ita ut vesicula sæpe matura destruat. Pruritus in dolorem pungentem ardentemque commutatur, dum epidermis, si vesicula integra manet, secretions ichorosæ paulatim magis à cute elevatur, ita ut vesicula in initio pellucida, postea subflava, subrubra, ex cæruleo nigricans plerumque altero die jam ad magnitudinem pisi accrescat. Ambitus intumescit et prope vesiculam colorem ex cæruleo rubrum manifestat, qui color tumoris peripheriam versus pallidum transit."

peculiar vesicle; and the early death, hardening, darkening, and insensibility of the immediate substratum; are the leading features of this history. Even in this early phase it has marked peculiarities, which, if things happened always as they are described in books, ought to lead to the recognition of the disease.

From the nature of the case, the practitioner who has to act upon it will, however, always find himself in a trying dilemma. The affection only admits of cure when, to the uninformed, its aspect is trivial, and it can only be cured by a process which leaves a mark. But to make an abiding scar on the face, say of a fair young lady, for the treatment of what, at the worst, appeared to be no more than a common boil, is a proceeding that would be likely to inflict (at any rate, in the eye of the parties most interested) a scar quite as abiding on the reputation of the practitioner who made it. But the responsibility, great as it is, cannot be got over by attempting to evade it. The alternatives on both sides are painful enough, and can only be fitly dealt with by the decision which is the prerogative of sure knowledge. What is most needed among ourselves is the diffusion of information on the whole subject; and I would venture to suggest that the New Sydenham Society might do a good service by giving abstracts from the best essays upon it, and by adding to the series of plates it is now publishing some figures of malignant pustule in its various, and especially in its early stages.

There is one other topic on which I must needs touch for a moment before I bring these remarks to a close. Even those who may hesitate to adopt to the full the theory put forward in this paper of the cases related in it, will admit that in the view here taken of their origin

there is enough of probability, at any rate, to show the pressing need of some fresh organisation to prevent the revolting traffic in diseased meat which now prevails. From the details given under this head, it is clear that the measures at present employed for this object signally fail of their purpose.

If we would look at the matter from a more general point of view, the occasion would justify a still larger design. We have had scientific commissions not a few, to inquire into the sanitary condition of men. Might it not be worth while to inquire into the sanitary condition of the animals from whose substance men repair the waste of their own? The result would be, I doubt not, to disclose, as in the case of men, an amount of preventible disease, of which few have, at present, the remotest idea. In this way, and as a money speculation merely, few things, I suspect, would pay the country so well. But we are all, more or less, interested in such an inquiry in a way that touches us more nearly than money ever can.\*

By the same mysterious law by which we convert the flesh of animals into our own, we often become the heirs of their maladies, and may even be involved with them in a common death.

The number of deaths annually occurring that are actually recognised as thus arising is by no means inconsiderable. A more perfect knowledge would, doubtless, add many to their number which are never thus regarded in present classifications. Here, for instance,

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\* There is a French work whose title shows that our neighbours are more alive to considerations of this kind than we are. I refer to Professor Delafond's *Police Sanitaire des Animaux Domestiques*. I have been unable to obtain a sight of the work itself.

under the head of malignant pustule—if the views put forward in this paper be true—some considerable proportion of three or four hundred annual deaths must, at once, be so set down, which have hitherto been registered under names conveying no suspicion whatever of an animal origin. It is impossible, in fact, to look much into this subject without seeing that this is one of the avenues through which disease and death may enter which is not sufficiently kept before the physician's mind.\*

The interest which a comprehensive inquiry into the diseases of animals would have for medical science generally can scarcely be overrated. What has already been done in tracing the dissemination of a few species of entozoa and other parasites is an earnest of what might be expected from investigation in this and other fields.

In the great field of the epidemic and contagious disorders by which the animals that minister to man are afflicted, a rich harvest yet remains to be gathered. It is enough to look over the outline of these disorders,

\* The following statement, which appeared in the *Times* while I was in the act of sending these notes to press, offers a startling commentary upon them:—

"The Royal Dublin Society met on Saturday evening to hear a lecture from Professor Gamgee, on Disease and Mortality among Cattle. When he had concluded, Mr. Gauley, salesmaster, made an extraordinary statement. He said that unless some means were devised to give the farmer some compensation for diseased cattle, it was impossible to prevent him from selling them, or the butcher from killing and selling them. Unless some society were formed to have diseased meat paid for, it would be killed and eaten. There was no use in mincing the matter he said, every one of the salesmen sold diseased cattle. The farmer could not otherwise pay his rent. The disease is so prevalent that he could not live were he to submit his cattle to destruction." (*Times*, Wednesday, Dec. 17, 1862.)

vaguely, even as (for the most part) it is mapped out in veterinary works, to see what instruction their history must contain could it once be thoroughly made out.

A searching investigation into them would open up analogies that could not fail to be of the deepest interest in their bearing on the great group of kindred maladies which are so fatal to man. It is not too much to say that many a vexed problem relating to these last would here find a ready solution. It is, in fact, only by thus extending the survey that it is possible to obtain a just and comprehensive view of the nature and mode of propagation of that great and remarkable brood of morbid agents, which are the material cause of contagious diseases, and which, low as they are in the order of created things—as yet undefined in nature, but specific in essence—are so destructive to men and animals alike.

As related to animals, such an inquiry is the more inviting, because its prosecution offers facilities from which we are debarred in our own case. In studying the epidemics which infest sheep and oxen, for instance, *experiment*—that great instrument of modern research—might often be brought into play; in forms, too, in which experiment is most sure of its aim, most easy to interpret, and least likely to mislead. The light which it has already thrown on the history of the particular disease which is the subject of this paper is a good example, both of the extent and nature of the elucidation it is capable of affording.

By this and other means so employed, we might, in no long time, succeed in investing our knowledge of whole provinces of disease with much of that precision which is the charm of the physical sciences, and medicine's greatest want. By the same means, we should gradually

be accumulating data whereby to make the work of prevention sure, and thus help towards that great consummation to which we may even now confidently look—the ultimate deliverance of man from that vast brood of contagious diseases, which at present seem to mock his power—whose very existence is a humiliation to him, and which, under the form of slighter visitations or of wide-spread pestilence, bring every year so many millions to the grave by a cruel and untimely death.

P.S. About a fortnight after the foregoing paper was read, I received from Dr. Markham an extract from the *American Medical Times* of July 19th, 1862, containing a review of a paper on Malignant Pustule in the United States, by Dr. A. N. Bell, physician to Brooklyn City Hospital—the paper being a reprint from the *Transactions* of the New York State Medical Society. I have not seen the paper itself; but judging from the review, there would appear to be an almost complete coincidence between the conclusions at which Dr. Bell has arrived, both as regards the origin of the disease and its mode of propagation, and those put forward by myself. As these conclusions were come to in entire independence of one another, the fact may be taken as a strong presumption in favour of their soundness. The following is Dr. Bell's description of the affection:—

“It first appears in the form of a painful swelling, which after a lapse of time, varying from one to three days, rarely more, developes upon its central part, a small reddish or purple spot, accompanied with itching. In the course of twelve or fifteen hours more this spot changes into a bleb or vesicle, not usually larger than the bead of a pin, containing a reddish brown or a yel-

lowish fluid. Owing to the continued itching, the vesicle is ordinarily ruptured soon after its appearance; if otherwise, it dries up in about thirty-six hours, leaving the exposed derma dry, and generally of a livid colour. Itching now ceases; and after a time, varying from a few hours to a day, the centre of this discoloured and denuded surface begins to grow hard, and becomes surrounded by an inflamed areola covered with numerous small vesicles similar to the vesicle which first appeared. The middle of this areola is depressed, and the colour varies from yellow to black. It is now hard in the centre, and more painful than at any other stage. It is, however, a remarkable feature of malignant pustule that severe pain is generally absent; and this character, so different from all other acute inflammations of the skin, is a valuable negative diagnostic of the disease. During the next twenty-four or forty-eight hours the subcutaneous tissue becomes involved; the tumour strikes deeper, and rapidly extends; yet it is so indurated as to be easily circumscribed, and its confines determined without difficulty. Meanwhile the central point, now of brown or livid hue, exceedingly hard and insensible, becomes gangrenous. If the disease ceases to make further progress, an inflamed circle of vivid redness now surrounds the gangrenous portion; the tumefaction which had before rapidly extended diminishes, and the patient experiences something like an agreeable warmth, accompanied by a pulsatory motion of the affected part. The pulse, which had before grown irritable and feeble, revives; strength increases; and if there has been some degree of fever, accompanied with nausea, as occasionally happens, it is resolved into a gentle perspiration, and the nausea ceases. Suppuration now sets in between

the living and the dead parts of the pustule, and the detachment of the gangrenous portion leaves a suppurating surface of variable extent in different cases. Should the disease, on the contrary, tend to an unfavourable issue, generally no suppuration takes place; the gangrene spreads rapidly from the centre to the circumference of the tumour; the pulso becomes smaller and more contracted; the patient complains of extreme lassitude with an inability to sleep, is attacked with fainting fits, and becomes passive as to the result; there is disinclination to take food or medicine, or to have anything done, and there is a total loss of appetite; the tongue is dry and brown; the features shrink; the skin is parched; the eyes are glassy; cardialgia and low delirium premonish the fatal termination."

It is impossible not to recognise, at once, in this description the same disease as that which is the subject of this paper, and the identity of both with the malignant pustule of the continental writers.



ADDITIONAL NOTE.

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IN the preceding paper, I ventured on the opinion that the reason why the disease known by the name of Malignant Pustule has remained hitherto almost unnoticed in England is, not that it does not occur, but that, except by one or two observers, its real nature has not been recognised.

In confirmation of this opinion I may state that, during and since the publication of the paper in the JOURNAL, I have been favoured by medical men living in various parts of England with numerous histories of characteristic cases of this peculiar and striking malady. Two of the number, on account of their special interest, may be fitly recorded here, by way of appendix to those related in the paper itself.

For my knowledge of the first of the two, I am indebted to the kindness of Mr. Nunneley of Leeds. The data which Mr. Nunneley has placed in my hands consist of two drawings with memoranda attached. One of the drawings represents the head of the patient. The appearances are in the highest degree characteristic. It is very remarkable that, although the disease began in the hand, the head and face present precisely the same aspect as that which is observed when it begins in these

parts. There are the same enormous swelling, the same black discoloration, and, in particular, the same thickening and negro like protuberance of the lips, which were such striking features of the cases which came under my own observation, and in all of which the disease began in the mouth or in the immediate neighborhood of it.

The subject of Mr. Nunneley's case was a young man, 19 years old, and a *plasterer* by trade. His illness occurred in April 1856. About a month before, he was bitten on the knuckle of the left forefinger by a young dog. The dog was quite well. The wound, which was small, festered, and was still open at the time of death. It did not, however, prevent the man from continuing his work. The disease began in the injured hand.

"When I first saw him," Mr. Nunneley says, "the arm was enormously swollen and greatly discoloured, as were also the face and head." These last parts were nearly twice their natural size.

The whole of the body and limbs, but more particularly the lower limbs, were covered with purple blotches. When these first appeared, they were of a brownish-red; but they afterwards became violet, and showed a tendency to spread. In some of these blotches, vesicles containing a dark-coloured serum formed around a central patch of a somewhat lighter shade. (These appearances are represented in the second drawing.)

The patient died six days after the onset of the malady. The mind continued unimpaired to the last.

On examination of the body, the lungs were found much congested, and there was dark coloured serum in both pleuræ. The blood was diffuent.

This case occurred at the time when the poisoning

cases of Dove and Palmer were so much canvassed by the public, and it was in consequence of Mr. Nunneley's connection with them that he was called in to the patient. The fact is worth recording, as showing two things : first, that the disease was of a very uncommon character ; and secondly, that the friends of the patient associated the idea of *poisoning* with it.

Mr. Nunneley himself says : " The appearance of the young man was so peculiar that I never saw anything like it before " ; and several other eminent surgeons who visited the patient with him made the same remark.

The aspect of the case, as exhibited in the drawing, was equally strange to the medical gentlemen who gave evidence for the defence on Palmer's trial, and not one of the number could form even a guess as to the cause of the malady.

Mr. Nunneley rightly supposed that it was a case of " the malignant pustule of the continent."

A clue to its probable origin, apparently overlooked by these gentlemen, seems to me to be furnished by the *calling* of the patient. Two points in the history may be taken to be pretty sure. The first is, that the man was not inoculated with malignant pustule by the dog ; the second, that, as the disease began in the injured part, its virus must have been subsequently received through the open wound. To complete the chain of evidence, we must remember that, in spite of the sore on his finger, the patient continued to work as usual. Now, plasterers are constantly handling *bullock's hair*, which is a large ingredient of mortar ; and as bullock's hair is known to be a very common vehicle of the charbon virus, it seems to me to be highly probable that the wounded finger received the contagion from this source.

For the particulars of the second case, I am indebted to the kindness of Dr. Milner Barry of Tunbridge Wells; and I give them in his own words:—

“ Mr. J. E., aged 47, a respectable *butcher* of this town, was apparently in perfect health on the morning of Sunday, July 14th, 1861. In the evening, as he was sitting with his family, he was observed to be picking at a little sore on his upper lip, a little below his right nostril. He had only then noticed its presence, having had his attention directed to the lip by a peculiar itching and tingling sensation, which compelled him to keep rubbing the sore spot.

“ On Monday, July 15th, there was no change, and he did not complain of feeling ill.

“ On the 16th, he went to Tunbridge market, a distance of five miles; and having returned home early, he went to the hay-field to see how his haymaking was getting on. Thinking that his haymakers were working rather sluggishly, he scolded them for their idleness, threw off his coat, and set to work lustily, to show them a good example. It was a warm and rather moist day, the temperature in the shade being 73°. One of the men who was working next to Mr. E. remarked that he did not seem to get hot, or to perspire, from his exertions, although the sweat was pouring down his own face profusely. In the afternoon, Mr. E. felt ill, and went home and lay down, but was well enough to come down to tea. The lip continued to be itchy, and to tease him, but did not swell. He allayed the itching by bathing it repeatedly with warm water. He had a restless, uncomfortable night; but got up early next morning (July 17), and went off to the hay-field. After working there vigorously for an hour, he was compelled to give up and

return home; and immediately went to his bedroom and called to his wife to help him to bed, for he felt very ill. When in bed, he said that he should never leave that bed again, and he proceeded to give directions respecting his affairs. His usual medical attendant was sent for, and noticed that he looked pale, and that there was apparently a little gathering in the lip.

"On Thursday morning, July 18th, the swelling of the lip had increased, and appeared to contain matter. It was lanced, but only a little reddish serum was discharged from the wound. The swelling increased rapidly during the day, and spread over the face; and by evening, the right eye was closed.

"On Friday, July 19, the lip was considerably swollen, and the swelling and discoloration extended completely over the face. The left eye was closed.

"On Saturday morning, July 20th, at ten o'clock, I saw him for the first time, in consultation with his regular medical attendant, an experienced surgeon.

"Mr. E. had been a handsome, well-featured man. He was now so frightfully disfigured that I could not recognise him. The face seemed featureless, swollen out of all shape and comeliness, and of a livid, purple hue. The upper lip was frightfully enlarged; the eyes were closed tightly; the eyelids were puffy, discoloured, and œdematous, and their edges crusted over with a gummy exudation. The swelling and discoloration affected the whole of the face, and all the anterior region of the head. He was propped up in bed, muttering deliriously; his hands trembling, his breathing hurried, the skin perspiring, the belly tympanitic, and the pulse so feeble and so frequent that it could not be accurately counted.

"Brandy and stimulants were freely administered;

Accession no  
10715

Author

Budd, W.

Variola ovin  
sheep's small

Call no. 186

Translati











465 **Budd** (William, M.D.) *Variola Ovina, Sheep's Small Pox : or, the Laws of Contagious Epidemics Illustrated by an Experimental Type.* London, T. Richards, 1863  
 Sm. 8vo. 33 pp.  
*And his :*  
 On the occurrence of the Malignant Pustule in England. London, T. Richards, 1863  
 £2 2s  
 Sm. 8vo. 67 pp.  
 The 2 pamphlets unbound. Library stamp on title-pages.  
 Two rare items by one of the pioneers of Public Health. Budd, together with Snow, Simon, and others, proved that cholera and typhoid were water-borne, and did a great deal for the introduction of modern sanitary measures. Budd also made studies of the contagious diseases of animals, & advocated in some cases the immediate extermination of infected animals.

Accession no.

10715

Author

**Budd, William**  
**Variola ovina.**

Call no.

**Inoculation**  
**Vaccination**

